4.0 TRAINING SPECIAL USE AIRSPACE AFFECTED ENVIRONMENT AND CONSEQUENCES

This chapter contains both the affected environment and environmental consequences analysis for the Proposed Action and No Action Alternative within the training special use airspace associated with Elmendorf Air Force Base (AFB). The National Environmental Policy Act (NEPA) requires that the analysis address those areas and the components of the environment with the potential to be affected; locations and resources with no potential to be affected need not be analyzed.

Each resource discussion begins with a *definition* including resource attributes and any applicable regulations. The expected geographic scope of potential impacts is also identified as the Region of Influence (ROI). The ROI is defined as the outermost boundary of potential environmental consequences. For most resources in this chapter, the ROI is defined as the lands underlying the Military Operations Areas (MOAs) and Restricted Areas. However, for some resources (such as Air Quality and Socioeconomics), the ROI extends over a larger jurisdiction unique to the resource.

The *Existing Condition* of each relevant environmental resource is described to give the public and agency decision-makers a meaningful point from which they can compare potential future environmental, social, and economic effects. The *Environmental Consequences* section for each resource considers the direct and indirect effects of the Proposed Action and No Action Alternative described in Chapter 2.0 of this Environmental Assessment (EA). Cumulative effects are discussed in Chapter 5.0.

4.1 AIRSPACE MANAGEMENT

4.1.1 *DEFINITION*

As explained under Section 3.1.1., navigable airspace is a national resource administered by the Federal Aviation Administration (FAA). FAA has charted and published Special Use Airspace (SUA) for military and other governmental activities. Management of SUA considers how airspace is designated, used, and administered to best accommodate the individual and common needs of military, commercial, and general aviation. The FAA considers multiple and sometimes competing demands for aviation airspace in relation to airport operations, Federal Airways, Jet Routes, military flight training activities, and other special needs to determine how the National Airspace System can best be structured to address all user requirements.

The FAA has designated four types of airspace within the United States (U.S.): Controlled, Special Use, Other, and Uncontrolled airspace. Controlled airspace is airspace of defined dimensions within which air traffic control service is provided to Instrument Flight Rule (IFR) flights and to Visual Flight Rule (VFR) flights in accordance with the airspace classification (Pilot/Controller Glossary [P/CG] 2004). Controlled airspace is categorized into five separate classes: Classes A through E. These classes identify airspace that is controlled, airspace supporting airport operations, and designated airways affording en route transit from place-to-place. The classes also dictate pilot qualification requirements, rules of flight that must be followed, and the type of equipment necessary to operate within that airspace. Elmendorf aircrews fly under FAA rules when not training in SUA.

SUA is designated airspace within which flight activities are conducted that require confinement of participating aircraft, or place operating limitations on non-participating aircraft. Restricted Areas and MOAs are examples of SUA.

Other airspace consists of advisory areas, areas that have specific flight limitations or designated prohibitions, areas designated for parachute jump operations, Military Training Routes (MTRs), and Aerial Refueling Tracks (ARs). This category also includes Air Traffic Control Assigned Airspace (ATCAAs). When not required for other needs, ATCAA is airspace authorized for military use by the managing Air Route Traffic Control Center (ARTCC), usually to extend the vertical boundary of SUA.

Uncontrolled airspace is designated Class G airspace and has no specific prohibitions associated with its use.

Military training airspace currently used by aircrews at Elmendorf AFB includes MOAs, ATCAAs, MTRs, and Restricted Areas. Use of these airspace units is normally scheduled by the owning/using agency, and is managed by the military or the applicable ARTCC.

4.1.2 Existing Conditions

This section discusses the existing SUA that supports F-15C and F-15E training activity from Elmendorf AFB. Refer to Figure 2.2-1 for a depiction of airspace types. Alaskan SUA is managed by the 11th Air Force Commander.

4.1.2.1 Military Operations Areas

A MOA is airspace of defined vertical and lateral limits to separate and segregate certain non-hazardous military activities from IFR traffic and to identify for VFR traffic where these activities are conducted (P/CG 2004). A MOA is outside Class A airspace. Class A airspace covers the continental U.S. and limited parts of Alaska, including the airspace overlying the water within 12 nautical miles (NM) of the U.S. coast. Class A airspace extends from 18,000 feet above mean sea level (MSL) up to and including 60,000 feet MSL (P/CG 2004).

MOAs are considered "joint use" airspace. Non-participating aircraft operating under VFR are permitted to enter a MOA, even when the MOA is active for military use. Aircraft operating under IFR must remain clear of an active MOA unless approved by the responsible ARTCC. Flight by both participating and VFR non-participating aircraft is conducted under the "see-and-avoid" concept, which stipulates that "when weather conditions permit, pilots operating IFR or VFR are required to observe and maneuver to avoid other aircraft. Right-of-way rules are contained in Code of Federal Regulations (CFR) Part 91" (P/CG 2004). The responsible ARTCC provides separation service for aircraft operating under IFR and MOA participants. The "see-and-avoid" procedures mean that if a MOA were active during inclement weather, the general aviation pilot could not safely access the MOA airspace.

Table 4.1-1 describes the MOAs used by Elmendorf AFB and other Alaskan military users for flight training.

Table 4.1-1. Description of MOAs

MOA	Altitudes		Hours of Use [1]		*Controlling ARTCC*
	Minimum	*Maximum*[2]	*From*	*To*	
Galena	1,000 AGL	FL 180[3]	8:00 a.m.	6:00 p.m.	Anchorage
Naknek 1	3,000 AGL	FL 180	10:00 a.m.	3:00 p.m.	Anchorage
Naknek 2	3,000 AGL	FL 180	10:00 a.m.	3:00 p.m.	Anchorage
Stony A	100 AGL	FL 180	8:00 a.m.	6:00 p.m.	Anchorage
Stony B	2,000 AGL	FL 180	8:00 a.m.	6:00 p.m.	Anchorage
Susitna	10,000 MSL or 5,000 AGL (whichever is higher)	FL 180	8:00 a.m.	6:00 p.m.	Anchorage
Birch	500 AGL	Up to and including 5,000 MSL	8:00 a.m.	6:00 p.m.	Anchorage
Buffalo	300 AGL	7,000 MSL	8:00 a.m.	6:00 p.m.	Anchorage
Eielson	100 AGL	FL 180	8:00 a.m.	6:00 p.m.	Anchorage
Fox 1	5,000 AGL	FL 180	8:00 a.m.	6:00 p.m.	Anchorage
Fox 2	7,000 MSL	FL 180	8:00 a.m.	6:00 p.m.	Anchorage
Fox 3	5,000 AGL	FL 180	8:00 a.m.	6:00 p.m.	Anchorage
Yukon 1	100 AGL	FL 180	8:00 a.m.	6:00 p.m.	Anchorage
Yukon 2	100 AGL	FL 180	8:00 a.m.	6:00 p.m.	Anchorage
Yukon 3 High	10,000 MSL	FL 180	10:00 a.m.	3:00 p.m.	Anchorage
Yukon 3A Low	100 AGL	10,000 MSL	10:00 a.m. 1:30 p.m.	11:30 a.m. 3:00 p.m.	Anchorage
Yukon 3B	2,000 AGL	FL 180	Only During Major Flying Exercise		Anchorage
Yukon 4	100 AGL	FL 180	10:00 a.m.	3:00 p.m.	Anchorage
Yukon 5	5,000 AGL	FL 180	Only During Major Flying Exercise		Anchorage
Viper[4]	500 AGL	FL 180	7:00 a.m.	10:00 p.m.	Anchorage

Notes:
1. Days of use are Monday through Friday. All times are local times as normally scheduled.
2. Maximum is up to, but not including unless otherwise noted.
3. Described in terms of hundreds of feet MSL using a standard altimeter setting. Thus, FL180 is approximately 18,000 feet MSL.
4. Viper A/B are divided at 10,000 feet MSL.

FL = Flight Level; AGL = above ground level; MSL = mean sea level

Source: FAA 2000

4.1.2.2 Air Traffic Control Assigned Airspace

An ATCAA is airspace of defined vertical and lateral limits, assigned by Air Traffic Control (ATC), for the purpose of providing air traffic segregation between the specified activities being conducted within the assigned airspace and other IFR air traffic (P/CG 2004). This airspace, if not required for other purposes, may be made available for military use. ATCAAs are normally structured and used to extend the horizontal and/or vertical boundaries of SUA such as MOAs and Restricted Areas.

With the exception of the Buffalo MOA and the Birch MOA, all of the MOAs currently used by Elmendorf AFB aircrews have associated ATCAAs. Through letters of agreement with the FAA, ATCAAs may extend up to and above 60,000 feet MSL. Several of the airspace units used by Elmendorf AFB aircrews are "capped" at lower altitudes by the managing ARTCC to allow unimpeded transit by civil and commercial aircraft traffic.

4.1.2.3 Military Training Routes

MTRs are flight corridors developed and used by the Department of Defense (DoD) to practice high-speed, low-altitude flight, generally below 10,000 feet MSL. Specifically, MTRs are airspace of defined vertical and lateral dimensions established for the conduct of military flight training at airspeeds in excess of 250 knots indicated airspeed (KIAS) (P/CG 2004). MTRs are developed in accordance with criteria specified in FAA Order 7610.4 (DoD 2004). They are described by a centerline, with defined horizontal limits on either side of the centerline, and vertical limits expressed as minimum and maximum altitudes along the flight track. MTRs are identified as Visual Routes (VRs) or Instrument Routes (IRs). No changes to MTRs are proposed as part of the F-22A beddown.

VRs are used by DoD and associated Reserve and Air Guard units for the purpose of conducting low-altitude navigation and tactical training under VFR below 10,000 feet MSL at airspeeds in excess of 250 KIAS. IRs are used by DoD, including associated Reserve and Air Guard units, for the purpose of conducting low-altitude navigation and tactical training in both IFR and VFR weather conditions at airspeeds in excess of 250 KIAS.

MTRs supporting Elmendorf operations are described in Table 4.1-2. These MTRs are grouped in packages of four routes. Two of the routes are VRs and two are IRs. All four routes cover the same ground track under different conditions. One MTR over the ground track will be for one direction, VFR training, another for the opposite direction VFR training, and the remaining two for IR training in each direction. Thus, if a pilot is assigned a specific numbered route, the pilot knows no one else is using a different number that occupies the same airspace.

4.1.2.4 Restricted Areas

A Restricted Area is designated airspace that supports ground or flight activities that could be hazardous to non-participating aircraft. A Restricted Area is designated under 14 CFR Part 73, within which the flight of non-participating aircraft, while not wholly prohibited, is subject to restriction. Most restricted areas are designated "joint-use" and IFR/VFR operations in the area may be authorized by the controlling ATC facility when it is not being utilized by the using agency. The restricted airspaces, R-2202, R-2203, and R-2205, are Army ranges used by the Air Force for training. R-2206 is not a flying range. R-2211 is Air Force-owned and managed airspace to support training activities. According to FAA Order 7400.8M, R-2202C is between 10,000 and 29,000 feet MSL and R-2202D is 31,000 feet MSL to unlimited. Specific elements of these airspace elements are described in Table 4.1-3.

Table 4.1-2. Description of MTRs

MTR	Altitudes		Route Width (In NM)[1]		Hours of Operation [2]	
	Min	*Max*	*Min*	*Max*	*From*	*To*
IR-900 IR-916 VR-1900 VR-1916	100 AGL	10,800 MSL 1,500 AGL	10	10	8:00 a.m.	8:00 p.m.
IR-909 IR-939 VR-1909 VR-1939	100 AGL	10,600 MSL 1,500 AGL	10	10	8:00 a.m.	8:00 p.m.
IR-952 IR-953 VR-954 VR-955	100 AGL	17,000 MSL 9,500 MSL	10	10	8:00 a.m.	8:00 p.m.
IR-922 IR-923 VR-940 VR-941	100 AGL	16,200 MSL	10	10	8:00 a.m.	8:00 p.m.
IR-919 IR-921 VR-937 VR-938	100 AGL	14,700 MSL	10	10	8:00 a.m.	8:00 p.m.
IR-917 IR-918 VR-935 VR-936	100 AGL	10,600 MSL 9,500 MSL	10 5.5	10	8:00 a.m.	8:00 p.m.
IR-903 IR-913 VR-933 VR-934	100 AGL	12,000 MSL	10	10	8:00 a.m.	8:00 p.m.
IR-962 IR-963 VR-960 VR-961	100 AGL	7,100 MSL	7	10	8:00 a.m.	8:00 p.m.
IR-972 IR-973 VR-970 VR-971	100 AGL	8,200 MSL	7	10	8:00 a.m.	8:00 p.m.
IR-902 IR-912 VR-1902 VR-1912	100 AGL	7,000 MSL 1,500 AGL	10	10	8:00 a.m.	8:00 p.m.
IR-905 IR-915 VR-1905 VR-1915	100 AGL	13,700 MSL 1,500 AGL	10	10	8:00 a.m.	8:00 p.m.
IR-901 IR-911 VR-931 VR-932	100 AGL	7,200 MSL 6,500 MSL	10	10	8:00 a.m.	8:00 p.m.

Notes: 1. NM = Nautical Miles (One Nautical Mile is approximately 6,077 feet)
2. Operating Days are Monday through Friday. All times are local times as normally scheduled.

Source: Air Force 2005a.

TABLE 4.1-3. DESCRIPTION OF RESTRICTED AIRSPACE

Restricted Area	ALTITUDES		HOURS OF USE [1]		*Controlling ARTCC*
	Minimum	*Maximum*	*From*	*To*	
R-2202A	Surface	9,999 MSL[2]	6:00 a.m.	5:00 p.m.	Anchorage
R-2202B	Surface	9,999 MSL	6:00 a.m.	5:00 p.m.	Anchorage
R-2202C	10,000 MSL	Unlimited	By Notice to Airmen	Scheduled by Agreement	Anchorage
R-2203A[3]	Surface	11,000 MSL	5:00 a.m.	12:00 p.m.	Anchorage
R-2203B[3]	Surface	11,000 MSL	5:00 a.m.	12:00 p.m.	Anchorage
R-2203C[3]	Surface	5,000 MSL	5:00 a.m.	12:00 p.m.	Anchorage
R-2205	Surface	20,000 MSL	6:00 a.m.	6:00 p.m.	Fairbanks Approach
R-2206[4]	Surface	8,800 MSL	Continuous	Continuous	Anchorage
R-2211	Surface	18,000 MSL	7:00 a.m.	5:00 p.m.	Anchorage

Notes: 1. Days of use are Monday through Friday. All times are local times as normally scheduled.
2. MSL = Feet above mean sea level.
3. Ranges are not expected to be used by the F-22A.
4. Not used for training.

Range management involves the development and implementation of those processes and procedures required by Air Force Instruction (AFI) 13-212, Volumes 1, 2, and 3, to ensure that Air Force ranges are planned, operated, and managed in a safe manner, that all required equipment and facilities are available to support range use, and that proper security for range assets is present. Specific direction on different range activities is contained in AFI 13-212, Volume 1, *Range Planning and Operations*, Volume 2, *Range Construction and Maintenance*, and Volume 3, *SAFE-RANGE Program Methodology* (Air Force 2001c, 2001d, 2001e). The focus of range management is on ensuring the safe, effective, and efficient operation of Air Force ranges. The overall purpose of range management is to balance the military's need to accomplish realistic testing and training with the need to minimize potential impacts of such activities on the environment and surrounding communities (Air Force 2001c, 2001d, 2001e).

4.1.3 ENVIRONMENTAL CONSEQUENCES OF BEDDOWN

4.1.3.1 PROPOSED ACTION

Table 2.2-4 in Chapter 2.0 describes the existing and projected MOA usage associated with the proposed F-22A beddown. The combination of F-22A and F-15C training aircraft in the MOAs after a beddown is similar to the existing use by F-15C and F-15E aircraft. This change in use is not expected to affect regional or MOA airspace management. The usage of the airspace will not change to the extent that civil aviation could be affected. The time spent at higher altitudes by the F-22A, including in the ATCAAs, as compared with the F-15E, should have a minimally beneficial effect upon general aviation that generally flies at lower altitudes.

F-22A aircraft are projected to use some MTRs for limited low altitude training. F-22A use is approximately one-half the existing F-15E use. Table 2.2-5 presents existing F-15E and projected F-22A MTR use. This reduction in MTR activity should have minimal benefit to the extensive general aviation activity in Alaska.

Range use by the F-22A is substantially less than that of the F-15E. The F-22A is designed to carry smart munitions with long range stand-off capabilities. Most air-to-ground training in the airspace would be performed by flying specific training profiles and practicing the release of munitions under launch conditions without releasing any munitions. Practice munition use projected for Alaskan training ranges would be performed at lower altitudes to experience the handling characteristics of the aircraft under deployment conditions. Table 2.2-6 compares existing F-15E and projected F-22A training munition use. None of the training activities within Alaskan SUA would be expected to result in any changes to airspace management from those existing for the F-15E and F-15C training. With regard to Airspace Management, the Proposed Action would not require any changes to how the airspace is currently managed. The mitigation in the 1995 MOA EIS ROD still applies (Air Force 1995). A series of studies were conducted as part of the MOA EIS. Dissemination of information was found to be an important element in explaining airspace management and use. For example, information boards along the Chena River in the state recreation area explain military aircraft training use of the overlying airspace.

Alaska Native Concerns

During scoping, Alaska Native members of several villages expressed concerns that the beddown of the F-22A could increase the risk of conflicts with small aircraft serving communities under special use airspace. As described above, existing awareness and avoidance procedures implemented by the Air Force, and standard FAA flight rules are designed to prevent airspace conflicts. These FAA rules require that all pilots are equally responsible to apply "see and avoid" techniques when operating an aircraft. As noted during scoping meetings, enhanced F-22A electronics and situational awareness are projected to reduce risks of conflicts with general aviation.

4.1.3.2 No Action

Existing MOA, MTR, range, and other airspace usage would not change with the No Action. Until Base Realignment and Closure (BRAC) was fully implemented, F-15Cs and F-15Es from Elmendorf AFB would continue to train in the airspace as they do today.

4.2 Noise

4.2.1 Definition

Within MOAs and overlying ATCAAs, subsonic flight is dispersed and often occurs randomly or, due to either airspace configuration or training scenarios, it may be concentrated or channeled into specific areas or corridors. The Air Force has developed the MR_NMAP (MOA-Range NOISEMAP) computer program (Lucas and Calamia 1996) to calculate subsonic aircraft noise in these areas. These computer programs calculate projected noise based on aircraft type, flight characteristics, meteorological conditions, and training activities. The models are based upon data collected under military airspace and represent the best data available for environmental evaluation. MR_NMAP can calculate noise for both random operations and operations channeled into corridors. The model results are supported by measurements in several military airspaces (Lucas *et al.* 1995). The affected airspace for Elmendorf AFB includes the MOAs in which training aircraft operate randomly throughout the airspace.

> L_{DNMR} is the monthly average of the Onset-Rate Adjusted Day-Night Average Sound Level (L_{DN}). Noise levels are interpreted the same way for both L_{DN} and L_{DNMR}. The annual sortie-operations for a MOA is divided by 12 to define monthly average sortie-operations. For this Draft EA, all training airspace noise levels were calculated using L_{DNMR}.

The primary noise metric calculated by MR_NMAP for this assessment is the Onset Rate Adjusted Day-Night Average Sound

Level (L_{dnmr}). This is an extension of the Day-Night Average Sound Level (L_{dn}, also denoted DNL), and accounts for the additional annoyance due to the rapid onset rate of noise from low-altitude high-speed aircraft. This quantity has been computed for each of the primary airspace units potentially affected by the Proposed Action and No Action Alternative. As discussed in Appendix D, this cumulative metric represents the most widely accepted method of quantifying noise impact. However, it does not provide an intuitive description of the noise environment. People often desire to know what the loudness of an individual aircraft will be; MR_NMAP and its supporting programs can provide the maximum sound level (L_{max}) (Table 4.2-1) and sound exposure level, Sound Exposure Level (SEL), (Table 4.2-2) that accounts for both the duration and intensity of a noise event for individual aircraft at various distances and altitudes. The L_{max} indicates the maximum noise level that would be heard by an individual as the aircraft flies overhead. SELs reflect the complete noise exposure as an aircraft flies by, accounting for both the level and duration of the sound. Both measures are described in Appendix D. These two tables demonstrate that, at comparable speeds, the F-15C and F-22A produce similar L_{max} and SEL noise levels.

Table 4.2-1. Representative A-Weighted Instantaneous Maximum (L_{MAX}) in Decibels Under the Flight Track for Aircraft at Various Altitudes in the Primary Airspace[1]

Aircraft Type	*Airspeed*	*Power Setting[3]*	*300 AGL*	*500 AGL*	*1,000 AGL*	*2,000 AGL*	*5,000 AGL*	*10,000 AGL*	*20,000 AGL*
F-15C	520	81% NC	119	114	107	99	86	74	57
F-22A[2]	520	70% ETR	120	116	108	99	85	71	54
F-16A	450	87% NC	112	108	101	93	80	67	50
F-18A	500	92% NC	120	116	108	99	85	71	54
F-14A	530	100% NC	115	111	103	94	80	67	51
B-1B	550	101% RPM	117	112	106	98	86	75	61

Notes: 1. Level flight, steady, high-speed conditions.
2. Projected based on F-22A composite aircraft.
3. Engine power setting while in a MOA. The type of engine and aircraft determines the power setting: RPM = rotations per minute, NC = percent core RPM, and ETR = engine throttle ratio.
AGL = above ground level

Table 4.2-2. Sound Exposure Level (SEL) in Decibels under the Flight Track for Aircraft at Various Altitudes in the Primary Airspace[1]

Aircraft Type	*Airspeed*	*300 AGL*	*500 AGL*	*1,000 AGL*	*2,000 AGL*	*5,000 AGL*	*10,000 AGL*	*20,000 AGL*
F-15C	520	116	112	107	101	91	80	65
F-22A[2]	520	118	114	108	101	89	77	62
F-16A	450	110	107	101	95	85	74	59
F-18A	500	118	114	108	101	89	77	62
F-14A	530	112	109	103	96	84	73	58
B-1B	550	116	112	107	101	92	82	70

Note: 1. Level flight, steady, high-speed conditions.
2. Projected based on F-22A composite aircraft.
AGL = above ground level

4.2.2 Existing Conditions

4.2.2.1 Subsonic Flight

Table 4.2-3 shows the baseline and projected noise levels for the MOAs currently used for F-15C and F-15E training and projected for use for F-22A training. F-22A environmental consequences are further discussed in Section 4.2.3. Figure 4.2-1 reproduces Figure 1.1-2. Cumulative noise levels in all airspace units are 57 L_{dnmr} or less. Subsonic noise levels in all primary airspace units are below 45 L_{dnmr}. Noise levels below 45 L_{dnmr} are presumed to be approximately at ambient levels. In the secondary MOAs, noise levels tend to be higher than in primary MOAs. This is due to the total number of sortie-operations by all aircraft, but the F-15Cs are minor contributors.

Comments received during scoping requested a comprehensive presentation of noise effects. Aircraft noise effects can be described according to two categories: annoyance and human health considerations. Annoyance, which is based on perception, represents the primary effect associated with aircraft noise. Far less potential exists for effects on human health.

Studies of community annoyance to numerous types of environmental noise show that L_{dn}/L_{dnmr} correlates well with effects, and Schultz (1978) showed a consistent relationship between noise levels and annoyance. A more recent study reaffirmed and updated this relationship (Fidell *et al.* 1991). The updated relationship, which does not differ substantially from the original, is the current preferred form (see Appendix D).

In general, there is a high correlation between the percentages of groups of people highly annoyed and the level of average noise exposure measured in L_{dn}/L_{dnmr}. The correlation is lower for the annoyance of individuals. This is not surprising considering the varying personal factors that influence the manner in which individuals react to noise. The inherent variability between individuals makes it impossible to predict accurately how any individual will react to a given noise event. Nevertheless, findings substantiate that community annoyance to aircraft noise is represented quite reliably using L_{dn}.

Relation Between Annoyance and L_{dn}

L_{dn}/L_{dnmr}	*CDNL*	*% Population Highly Annoyed*
40	40	0.4
45	44	0.8
50	48	1.7
55	52	3.3
60	57	6.5

4.2.2.2 Supersonic Flight

Supersonic flight for fighter aircraft is primarily associated with air combat training. Supersonic activity is authorized in the MOAs under specific altitude restrictions. Supersonic flight produces an air pressure wave that may reach the ground as a sonic boom. The amplitude of an individual sonic boom is measured by its peak overpressure, in pounds per square foot (psf) and depends on an aircraft's size, weight, geometry, Mach number, and flight altitude. Table 4.2-4 shows sonic boom overpressures for the F-15C and F-22A aircraft in level flight at various conditions. The biggest single condition affecting overpressure is altitude. Maneuvers can also affect boom peak overpressures, increasing or decreasing overpressures from those shown in Table 4.2-4 (also see Appendix D).

Table 4.2-3. Baseline and Projected Noise Levels

	MOA/ATCAA	*Noise Measure*	*Baseline*	*Projected*
Primary Airspace	Galena[1]	L_{dnmr}	26	24.7
		CDNL	N/A	N/A
		Booms/Month	N/A	N/A
	Naknek 1/2[1]	L_{dnmr}	30.4	30.6
		CDNL	33.6	45.1
		Booms/Month	.3	3.7
	Stony A/B[2]	L_{dnmr}	39.9	38.4
		CDNL	51.2	53.9
		Booms/Month	15.0	27.8
	Susitna[3]	L_{dnmr}	42.3	41.0
		CDNL	N/A	N/A
Secondary Airspace	Birch[1]	L_{dnmr}	47.6	47.6
		CDNL	50	50
		Booms/Month	11.3	11.4
	Buffalo[1]	L_{dnmr}	42.0	41.9
		CDNL	50.2	50.3
		Booms/Month	11.9	12.2
	Eielson[1]	L_{dnmr}	47.5	47.3
		CDNL	52.2	52.5
		Booms/Month	18.9	20
	Fox 1/2/3[5]	L_{dnmr}	40.5	39.2
		CDNL	52.2	53.1
		Booms/Month	19	23.2
	Yukon 1[5]	L_{dnmr}	40.7	40.3
		CDNL	52.1	52.5
		Booms/Month	18.5	20.4
	Yukon 2[5]	L_{dnmr}	38.7	38.4
		CDNL	51.4	51.8
		Booms/Month	15.8	17.3
	Yukon 3[5]	L_{dnmr}	38.8	37.9
		CDNL	49.8	50.8
		Booms/Month	10.8	13.6
	Yukon 4[5]	L_{dnmr}	39	38.5
		CDNL	49.9	50.5
		Booms/Month	11.1	12.7
	Yukon 5[5]	L_{dnmr}	37.7	37.2
		CDNL	47.6	48.2
		Booms/Month	6.5	7.5
	Viper[4]	L_{dnmr}	56.5	56.5
		CDNL	N/A	N/A

Notes:
1. ATCAAs supersonic approved above 30,000 MSL.
2. Supersonic approved above 10,000 MSL or 5,000 AGL (whichever is higher).
3. Supersonic approved ONLY for Functional Check Flights above 12,000 MSL or 5,000 AGL (whichever is higher) on an East-West line south of Denali Reserve.
4. Supersonic not approved.
5. Supersonic approved above 12,000 MSL or 5,000 AGL (whichever is higher).

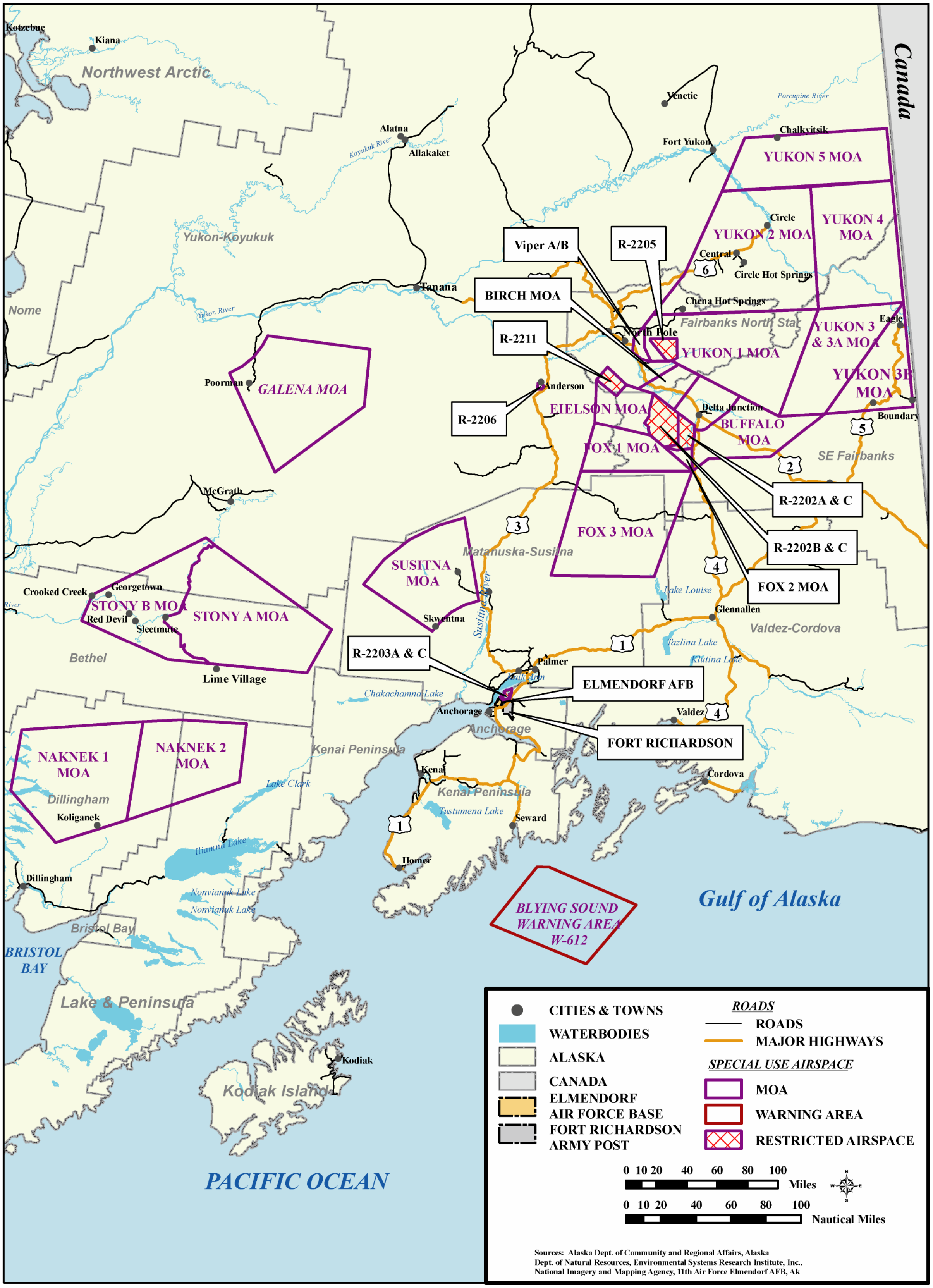

Figure 4.2-1. Training Special Use Airspace

Table 4.2-4. Sonic Boom Peak Overpressures (psf) for F-15 and F-22A Aircraft at Mach 1.2 Level Flight

Aircraft	**Altitude (feet)**			
	10,000	***20,000***	***30,000***	***40,000***
F-15C	5.40	2.87	1.90	1.46
F-22A	5.68	3.00	1.97	1.50

Community effects from sonic booms, in the form of annoyance, correlates well with the C-weighted Day-Night Average Noise Level (CDNL). CDNL is similar to L_{dn}, but uses C-weighting to account for the low frequency impulsive nature of sonic booms. Interpretation of CDNL uses a slightly different relation than interpretation of L_{dn}, with a given numeric value of CDNL generally representing more annoyance than the same numeric value of L_{dn}.

Aircraft exceeding Mach 1 always create a sonic boom, although not all supersonic flight activities will cause a boom at the ground. As altitude increases, air temperature decreases, and the resulting layers of temperature change, causing booms to be turned upward as they travel toward the ground.

Depending on the altitude of the aircraft and the Mach number, many sonic booms are bent upward sufficiently that they never reach the ground. This same phenomenon, referred to as “cutoff,” also acts to limit the width (area covered) of the sonic booms that reach the ground (Plotkin *et al*. 1989).

When a sonic boom reaches the ground, it impacts an area which is referred to as a “footprint” or (for sustained supersonic flight) a “carpet.” The size of the footprint depends on the supersonic flight path and on atmospheric conditions. Sonic booms are loudest near the center of the footprint, with a sharp “bang-bang” sound. Near the edges, they are weak and have a rumbling sound like distant thunder.

Sonic booms from air combat training activity have an elliptical pattern. Aircraft will set up at positions up to 100 nautical miles apart before proceeding toward each other for an engagement. The airspace used tends to be aligned, connecting the setup points in an elliptical shape. Aircraft will fly supersonic at various times during an engagement exercise. Supersonic events can occur as the aircraft accelerate toward each other, during dives in the engagement itself, and during disengagement. The long-term average (C-weighted Day-Night Average Sound Level [CDNL]) sonic boom patterns also tend to be elliptical.

Long-term sonic boom measurement projects have been conducted in four airspaces: White Sands, New Mexico (Plotkin *et al.* 1989); the eastern portion of the Goldwater Range, Arizona (Plotkin *et al.* 1992); the Elgin MOA at Nellis AFB, Nevada (Frampton *et al.* 1993); and the western portion of the Goldwater Range (Page *et al.* 1994). These studies included analysis of schedule and air combat maneuvering instrumentation data, and they supported development of the 1992 BooMap model (Plotkin *et al.* 1992). The current version of BooMap (Frampton *et al.* 1993; Plotkin 1996) incorporates results from all four studies. Because BooMap is directly based on long-term measurements, it implicitly accounts for maneuvers, statistical variations in operations, atmospheric effects and other factors.

A variety of aircraft conducting training perform flight activities that include supersonic events. For most fighter aircraft, these events occur during air-to-air combat, often at high altitudes. On average, F-15Cs fly supersonic about 7.5 percent of the time with Mach numbers usually 1.1 or less, but occasionally up to about 1.3. This is typical of all the current-generation supersonic aircraft studied in the development of BooMap. Table 4.2-3 shows baseline supersonic noise levels and sonic booms, CDNL, in affected airspace.

Table 4.2-3 also provides the estimated number of booms per month that would be generated at an average location in each airspace. Individual sonic boom footprints could affect areas from about 10 square miles to 100 square miles.

4.2.3 Environmental Consequences of Beddown

Proposed F-22A flight activities would not increase subsonic noise levels in any of the primary or secondary MOAs since sortie operations change little under the Proposed Action (refer to Table 2.2-1). In all primary MOAs, subsonic noise levels would not discernibly change (Table 4.2-3). F-22As would fly, on average, 80 percent of the time above 10,000 feet MSL, and 30 percent of the total time would be spent above 30,000 feet MSL. The higher altitude of the F-22A training sorties would produce no perceptible change in subsonic noise.

F-22A training in the MOAs and ATCAAs will take advantage of the F-22A enhanced supersonic capability relative to the F-15C and F-15E. The F-22A is projected to spend 25 percent of training time at or above supersonic speeds. For comparison, the F-15C is estimated to spend 7.5 percent of training time at supersonic speeds. This means that during a typical 14-minute air-to-air engagement, the F-22A would be supersonic 3 to 4.5 minutes, while the F-15C would be supersonic 1 to 2 minutes. The F-22A would also commonly achieve Mach numbers up to about 1.3, versus 1.1 for the F-15C. The majority of F-15C or F-15E supersonic activity is below 30,000 feet, while 60 percent of F-22A supersonic activity would be above 30,000 feet. Although the extent of the sonic boom footprint generated by an F-22A is larger than that generated by an F-15, the actual overpressure (psf) experienced on the ground is only about 75 percent of that resulting from an F-15 boom because on the ground booms generated at high altitude are weaker than those at low altitude. These factors for the F-22A are accounted for in BooMap.

Table 4.2-3 presents the baseline and projected sonic booms per month for each airspace. Lands under each airspace approved for supersonic training currently experience sonic booms. Under most airspaces, the monthly number of sonic booms would increase. Under the Naknek MOAs, the number of sonic booms would increase from an average of 1 every 3 months to an average of 4 per month. Overall, sonic booms toward the center of Stony A/B would be projected to increase by 13 booms per month; in the Fox MOA, monthly booms would increase by 4. Yukon 1 and 2 would experience an increase of 2 booms per month, while Yukon 3, 4, and 5 would experience an increase of 1 to 3 booms per month.

The F-22A beddown at Elmendorf AFB and training in existing Alaskan airspace will not have a discernible effect on subsonic noise over baseline conditions. The enhanced supersonic performance of the F-22A which contributes to its success in combat results in increased sonic booms on lands under the training airspace.

With existing sonic booms under the airspace, an increase of 1 to 4 booms per month is not likely to be perceived even by persons who spend extended periods out of doors under the airspace. This would be the case with all MOAs with the exception of the Stony MOAs.

Under the Stony MOAs, particularly toward the center of the airspace, the number of booms per month is projected to increase from the current 15 to a projected 28. This estimated change from an average of 1 every other day to an average of almost 1 per day is likely to be noticed by residents or long-term visitors. Such a change in sonic events would not be expected to affect human health or have an effect upon game or other animals which have experienced sonic booms for most of their lifetimes. However, if perceived, such a change could increase the number of highly annoyed individuals from an existing approximately 3 percent of the population to an estimated approximately 5 percent of the population under the airspace (see Appendix D).

Tables 4.2-1 and 4.2-2 demonstrate noise levels for the F-15C (comparable with the F-15E) and F-22A at the same airspeed on an MTR. The L_{max} and SEL levels are within 1 to 2 dB at all altitudes above 500 feet. On an MTR, the F-22A would not fly at speeds greater than the F-15E and is not expected to fly below 500 feet AGL. The near identical aircraft dB levels and the reduction of MTR use by 50 percent with the F-22A would result in reduced noise along the Alaskan MTRs.

Alaska Native Concerns

Noise was mentioned as a concern by Alaska Natives during scoping. Some expressed concerns that the F-22A could disrupt traditional subsistence activities associated with their communities, impact wildlife populations, or disrupt traditional cultural practices. As detailed above, subsonic noise would not change under the primary and secondary MOAs. In most areas, the number of sonic booms would increase by no more than 1 to 4 booms per month. Depending upon the extent of seasonal residents or long-term visitors to lands under the Stony MOAs, some individuals, especially those located toward the center of the airspace, would likely notice an increase from the existing 15 to the projected 28 booms per month. This change would likely be discernible to Alaska Natives or others residing under or using the land under the airspace for an extended period of time. For any damage claims associated with sonic booms, the Air Force has established procedures that begin with contacting the Elmendorf AFB Public Affairs Office.

4.2.4 No Action

No Action means that the beddown of the F-22A at Elmendorf AFB would not occur at this time. Until the BRAC schedule was implemented, F-15C and F-15E aircraft would continue to train in the airspace. The existing conditions include the presence of military aircraft in the airspace and the number of sonic booms estimated for baseline conditions on Figure 3.2-2.

4.3 Safety

4.3.1 Definition

Safety is the conduct of flight training within the Alaskan airspace in a manner that protects other users of the area, as well as military pilots. Elmendorf AFB has existing programs and guidance to support safe operations and reduce risks associated with training in Alaskan airspace (Air Force 1995; Elmendorf AFB 2003; 3rd Wing [3 WG] 2004). This section addresses flight, ground, explosive, and other safety issues associated with 3 WG aircrew use of the regional military training airspace and its supporting assets and facilities.

4.3.2 Existing Conditions

4.3.2.1 Flight Safety

As noted in Section 3.3, Elmendorf AFB F-15Cs and F-15Es have a low number of Class A mishaps. Since mishaps tend to occur more frequently around airfields and in low-altitude flight regimes, it is impossible to predict the precise location of an aircraft accident, should one occur. Major considerations in any accident are loss of life and damage to property. The aircrew's ability to exit from a malfunctioning aircraft is dependent on the type of malfunction encountered. The probability of an aircraft crashing into a populated area is extremely low, but it cannot be totally discounted. Several factors are relevant in the ROI: the immediate surrounding areas have relatively low population densities; pilots of aircraft are instructed to avoid direct overflight of population centers at very low altitudes; and, finally, the limited amount of time the aircraft is over any specific geographic area limits the probability that impact of a disabled aircraft in a populated area would occur.

Secondary effects of an aircraft crash include the potential for fire or environmental contamination. Again, because the extent of these secondary effects is situationally dependent, they are difficult to quantify. The terrain overflown in the ROI is diverse. For example, should a mishap occur in highly vegetated areas during a hot, dry summer, such a mishap would have a higher risk of extensive fires than would a mishap in more barren and rocky areas during the winter. When an aircraft crashes, it may release hydrocarbons. Those petroleums, oils, and lubricants not consumed in a fire could contaminate soil and water. The potential for contamination is dependent on several factors. For example, the porosity of the surface soils will determine how rapidly contaminants are absorbed, while the specific geologic structure in the region will determine the extent and direction of the contamination plume. The locations and characteristics of surface and groundwater in the area will also affect the extent of contamination to those resources.

Based on historical data on mishaps at all installations, and under all conditions of flight, the military services calculate Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory. These mishap rates do not consider combat losses due to enemy action.

As noted in Section 2.2.1, MTR use by F-22A aircraft is projected to be less than 40 percent of existing F-15E usage. This lower use could minimally reduce any risks of low altitude accidents.

In the case of MOAs, for each specific aircraft using the airspace an estimated average sortie duration may be used to estimate annual flight hours in the airspace. Then, the Class A mishap rate per 100,000 flying hours can be used to compute a statistical projection of anticipated time between Class A mishaps in each applicable element of airspace. In evaluating this information, it should be emphasized that those data presented are only statistically predictive. The actual causes of mishaps are due to many factors, not simply the amount of flying time of the aircraft.

Table 4.3-1 presents statistically projected Class A mishap data for flight operations conducted in the regional MOAs. Shown for each airspace element are the aircraft using the airspace, the mishap rate for that aircraft, the number of annual operations for those aircraft, the levels of use, and the statistically predicted time between mishaps considering the mishap rates and levels of use.

Table 4.3-1. Projected Class A Mishaps (Current Operations) (Page 1 of 2)

Airspace[1]	*Aircraft*	*Mishap Rate*	*Annual Operations*	*Annual Hours*	*Years Between Projected Mishaps*
Galena	F-15C	2.46	84	42	967.9
	F-15E	2.02	42	21	2,357.4
Naknek 1/2	F-15C	2.46	390	195	208.5
	F-15E	2.02	192	96	515.7
Stony A/B	F-15C	2.46	3,327	1,663.5	24.4
	F-15E	2.02	1,638	819	60.4
Susitna	F-15C	2.46	1,908	954	42.6
	F-15E	2.02	940	470	105.3
Birch	F-15C	2.46	8	4	10,162.6
	F-15E	2.02	4	2	24,752.5
	F-16	3.98	2,220	1,110	22.6
	A-10	2.36	1,542	771	55.0
Buffalo	F-15C	2.46	22	11	3,695.5
	F-15E	2.02	11	5.5	9,000.9
	F-16	3.98	2,320	1,160	21.7
	A-10	2.36	1,612	806	52.6
Eielson	F-15C	2.46	88	44	923.9
	F-15E	2.02	44	22	2,250.2
	F-16	3.98	3,636	1,818	13.8
	A-10	2.36	2,527	1,263	33.5
Fox 1/2/3	F-15C	2.46	320	160	254.1
	F-15E	2.02	160	80	618.8
	F-16	3.98	3,444	1,722	14.6
	A-10	2.36	2,393	1,197	35.4
Yukon 1	F-15C	2.46	146	73	556.9
	F-15E	2.02	73	36.5	1,356.3
	F-16	3.98	3,505	1,753	14.3
	A-10	2.36	2,436	1,218	34.8
Yukon 2	F-15C	2.46	116	58	700.9
	F-15E	2.02	58	29	1,707.1
	F-16	3.98	2,999	1,499	16.8
	A-10	2.36	2,084	1,042	40.7

Table 4.3-1. Projected Class A Mishaps (Current Operations) (Page 2 of 2)

Airspace[1]	*Aircraft*	*Mishap Rate*	*Annual Operations*	*Annual Hours*	*Years Between Projected Mishaps*
Yukon 3 A/B	F-15C	2.46	215	107.5	378.1
	F-15E	2.02	108	54	916.8
	F-16	3.98	1,933	967	26.0
	A-10	2.36	1,344	672	63.1
Yukon 4	F-15C	2.46	123	61.5	661.0
	F-15E	2.02	62	31	1,596.9
	F-16	3.98	2,069	1,034	24.3
	A-10	2.36	1,437	719	59.0
Yukon 5	F-15C	2.46	76	38	1,069.7
	F-15E	2.02	38	19	2,605.5
	F-16	3.98	1,212	606	41.4
	A-10	2.36	843	421	100.6
Viper[2]	F-15C	2.46	0	N/A	N/A
	F-15E	2.02	0	N/A	N/A
	F-16	3.98	3,629	1,815	13.8
	A-10	2.36	2,522	1,261	33.6

Notes: 1. W612 is an offshore warning area not included in the mishap analysis because it is not scheduled for regular F-22A training.
2. Viper A/B are divided at 10,000 feet MSL.
N/A = Not Applicable
Source: Air Force Safety Center 2006

As shown, the greatest risk associated with F-15C aircraft occurs in the Stony MOAs; for F-15E aircraft in the Stony MOAs; for F-16 aircraft in the Eielson and Viper MOAs; and, for A-10 aircraft in the Eielson MOA.

The F-22A is a new aircraft and has accumulated very few flight hours. For example, F-15 aircraft, which have been flown since 1972, have accumulated more than 4,998,100 flight hours. By comparison, as of early 2006, F-22A aircraft have flown only 3,246 hours (Air Force Safety Center 2006). Since mishap rates are statistically assessed as an occurrence rate per 100,000 flying hours, low use levels substantially influence the mishap rate. It is reasonable to expect that as the F-22A weapon system matures, its rates will be as low as, or lower than the F-15's current rates.

The 3 WG maintains detailed emergency and mishap response plans to react to an aircraft accident, should one occur. These plans assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on or off base. Response would normally occur in two phases. The initial response focuses on rescue, evacuation, fire suppression, safety, elimination of explosive devices, ensuring security of the area, and other actions immediately necessary to prevent loss of life or further property damage. Subsequently, the second, or investigation phase is accomplished.

First response to a crash scene is often provided by local emergency services nearest the scene. At the same time, the Air Force rapidly mobilizes a response team. The initial response element consists of those personnel and agencies primarily responsible to initiate the initial phase. This element will include the Fire Chief, who will normally be the first On-Scene Commander, fire-fighting and crash rescue personnel, medical personnel, security police, and crash recovery personnel. A subsequent response team will be comprised of an array of organizations whose participation will be governed by the circumstances associated with the mishap and actions required to be performed.

The Air Force has no specific rights or jurisdiction just because a military aircraft is involved. Regardless of the agency initially responding to the accident, efforts are directed at stabilizing the situation and minimizing further damage. If the accident has occurred on non-federal property, and depending on the nature of the accident, a National Defense Area would probably be established around the accident scene and the site will be secured for the investigation phase.

After all required actions on the site are complete, the aircraft will be removed and the site cleaned up. Depending on the extent of damage resulting from a Class A mishap, only the largest damaged parts may be located and removed from a crash site.

Activities of F-15Cs and F-15Es in the MOAs do not have a high potential for mishaps. Additionally, the potential for bird-aircraft strikes in the MOAs is negligible because the F-15Cs and F-15Es fly 90 percent of the time at altitudes above the zone (0 to 3,000 feet above ground level [AGL]) where 95 percent of strikes occur.

Flight safety includes the potential for interaction between general aviation and high performance military aircraft. Actions that have been implemented by Elmendorf AFB to reduce training flight activity in MOAs during hunting season reduce the potential for military aircraft being in a MOA while general aviation aircraft are ferrying hunters or fisherman. Discussions during scoping with pilots, hunters, fishermen, and recreationists flying to use the land under the MOAs revealed that, although they occasionally sighted a military aircraft, they generally flew at lower altitudes than the military aircraft and both pilots practiced see-and-avoid measures. Elmendorf AFB pilots have been able to safely train while being joint users of Alaskan airspace.

4.3.2.2 Ground and Explosive Safety

Aircrews from Elmendorf AFB train on air-to-ground ranges. Air-to-ground expenditure of munitions during training is limited to ranges within Restricted Airspace. As noted in Table 2.2-6, there would be a net decrease in munitions use associated with F-22A training. Air Force safety standards require safeguards on weapons systems and ordnance to ensure against inadvertent releases. All munitions mounted on an aircraft, as well as the guns, are equipped with mechanisms that preclude release or firing without activation of an electronic arming circuit.

When live (high-explosive) ordnance impacts a target, it detonates, and the effects of this detonation are blast and overpressure in the immediate vicinity of the target. When a training (inert) air-to-ground weapon impacts on or near the target, it may skid, bounce, or burrow under the ground for some distance from the point of impact, coming to rest at some distance from that point. The military services have analyzed extensive historic data on ordnance and incorporated those data into a computer program (called SAFE-RANGE). SAFE-RANGE considers the type of ordnance, the aircraft, the delivery profile, the target type, as well as other data such as the demonstrated accuracy of the aircraft's bombing and navigation system. The program then calculates an area around the target within which either effects from live ordnance will spread, or the specific training or inert ordnance under consideration will come to rest. This area has dimensions in front of, behind, and on either side of the target. The results reflect (at a 95 percent confidence level) the geographic area which will contain 99.99 percent of the specific weapon's deliveries and their effects (Air Force 2001a).

Operations conducted by 3 WG aircrews have been subjected to these analyses, and detailed operating procedures published by the air-to-ground ranges that support 3 WG training ensure that all safety standards are met for the type of ordnance delivered, and the delivery profile associated with that ordnance delivery.

4.3.2.3 Chaff and Flare Use

Chaff and defensive flares are managed as ordnance. Chaff and flares are authorized for use by 3 WG crews. Use is governed by detailed operating procedures to ensure safety.

Chaff, which is ejected from an aircraft to reflect radar signals, is small fibers of aluminum-coated silica packed into approximately 4-ounce bundles. When ejected, chaff forms a brief electronic "cloud" that temporarily masks the aircraft from radar detection. Although the chaff may be ejected from the aircraft using a small pyrotechnic charge, the chaff itself is not explosive (Air Force 1997). During fiscal year (FY) 2005, 3 WG aircrews expended 34,869 bundles of chaff (personal communication, Norby 2005). Two 1-inch by 1-inch plastic or nylon pieces and one 1-inch by 1-inch felt piece fall to the ground with each released chaff bundle. Appendix A provides an expanded discussion of chaff.

Defensive training flares consist of small pellets of highly flammable material that burn rapidly at extremely high temperatures. Their purpose is to provide a heat source other than the aircraft's engine exhaust to mislead heat-sensitive or heat-seeking targeting systems and decoy them away from the aircraft. The flare, essentially a pellet of magnesium, ignites upon ejection from the aircraft and burns completely within approximately 3.5 to 5 seconds, or approximately 400 feet from its release point (Air Force 1997). During FY 2005, 3 WG aircrews expended 21,313 flares (personal communication, Norby 2005).

The existing use of flares as defensive countermeasures results in small plastic, nylon, and aluminum-coated mylar pieces falling to the ground. As discussed in Appendix B, Characteristics of Flares and Appendix E, Review of Effects of Aircraft Noise, Chaff, and Flares on Biological Resources, flare residual materials are generally light with a high surface to weight ratio. This results in essentially no likelihood of a flare end cap, piston, or wrapper causing injury in the highly unlikely event residual material from a flare struck a person or an animal. The only exception is the flare safe and initiation (S&I) device which falls with the force of a medium-sized hailstone. Calculations of the likelihood of an S&I device striking an individual take into consideration the population density under the airspace, the number of flares deployed, and the amount of time the population was outside and unprotected even by a hat.

If, for example, a population has an average density of 0.5 persons per square mile and is exposed 50 percent of the time under an airspace the size of the Stony MOA, and if 8,000 flares were deployed annually in the airspace, the expected strikes to a person would be 1 in 4,000 years. In other words, it is extremely unlikely that anyone would be struck with the force of a medium-sized hailstone as a result of Air Force training with flares in the airspace.

Concerns have also been expressed that a flare has the potential to start a fire if a flare were still burning when it hit the ground. As described in Chapter 2.0, flares burn out in approximately 400 feet. Air Force altitude restrictions for flare use in Alaskan airspace (above 5,000 feet AGL June – September and above 2,000 feet AGL for the rest of the year) substantially reduce any risk of a fire from training with defensive flares.

4.3.3 Environmental Consequences of Beddown

Aircraft safety and bird-aircraft strikes are not expected to measurably differ from baseline conditions for the Proposed Action. All safety actions that are in place for existing F-15C and F-15E training will continue to be in place for F-22A training. These actions include scheduling to avoid, to the extent possible, high general aviation use of MOA airspace and altitude restrictions on flare use. Aircraft safety within the training airspace could even be enhanced by the improved radars and situational awareness provided by the F-22A systems.

Past scoping concerns in Alaska included the potential for an aircraft mishap at the seismic observatory at Burnt Mountain and the potential of radioactive materials escaping the facility in case of such an accident. The likelihood of a Class A mishap at one specific point is extremely low. Unrelated to any F-22A decision, the Air Force entered into a prior agreement with the state of Alaska to use alternative energy sources at the observatory.

Introduction of the F-22A into the training airspace would have no change in chaff or flare use. There would be no change in safety under the training airspace.

Each chaff used for F-22A training also releases three 2-inch by 4-inch mylar strips in addition to the plastic and felt pieces. This mylar material is similar to the material that wraps flares. Both the chaff and the flare mylar pieces are expected to disintegrate over an Alaskan season. No cases of animals ingesting such materials have been recorded, and under arid range areas where chaff and flares have been used for decades, pack rat nests have not been found to contain chaff or flare materials (Air Force 1997). No safety consequences from continued chaff and flare use are anticipated.

Alaska Native Concerns

A number of Alaska Native villages and traditional subsistence areas underlie Alaskan SUA. Based on past indications and scoping comments for this EA, Alaska Natives may be concerned about potential conflicts between military and private aircraft using the same airspace. Additionally, the potential for aircraft or munitions mishaps and the impacts on the underlying areas are of concern. As noted above, the F-22A pilot's improved situational awareness and the reduction in munitions use are expected to minimally improve safety within the airspace.

4.3.4 No Action

The existing conditions for aircraft flight safety, mishaps, and chaff and flare residuals would remain with the No Action Alternative.

4.4 Air Quality

4.4.1 Definition

Prevention of Significant Deterioration. Section 162 of the Clean Air Act (CAA) further established the goal of Prevention of Significant Deterioration (PSD) of air quality in all international parks; national parks which exceeded 6,000 acres; and national wilderness areas and memorial parks which exceeded 5,000 acres if these areas were in existence on August 7, 1977. These areas were defined as mandatory Class I areas, while all other attainment or unclassifiable areas were defined as Class II areas. Under CAA Section 164, states or tribal nations, in addition to the federal government, have the authority to redesignate certain areas as (non-mandatory) PSD Class I areas, e.g., a national park or national wilderness area established after August 7, 1977, which exceeds 10,000 acres. PSD Class I areas are areas where any appreciable deterioration of air quality is considered significant. Class II areas are those where moderate, well-controlled growth could be permitted. Class III areas are those designated by the governor of a state as requiring less protection than Class II areas. No Class III areas have yet been so designated. The PSD requirements affect construction of new major stationary sources in the PSD Class I, II, and III areas and are a pre-construction permitting system.

4.4.2 Existing Training

In Alaska, alternative forms of transportation and energy generation are a necessity given the isolated nature of many towns and villages. In terms of ground transportation, all-terrain vehicles (ATVs or 4-wheelers) replace the automobile in the warmer weather months and snow machines take their place as soon as the snow falls. These engines, as well as diesel generators used to produce electricity, contribute to the air emissions of the region. When reviewing the overall air quality of an area, consideration of these forms of exhaust emissions is important.

The likelihood for air quality impacts associated with airspace use was evaluated based on the floor height of the primary MOAs relative to the mixing height for pollutants. For the area of the primary MOAs, the mixing height is 2,000 feet. The affected environment for Elmendorf AFB training airspace includes two primary MOAs (Stony A and Galena) where flight activities would occur below the average mixing height of 2,000 feet. Table 4.4-1 summarizes baseline emissions from flight operations in these two MOAs. In these two MOAs, F-15Cs fly approximately 8 percent or less of the time below the mixing height. While the secondary MOAs permit flight below the mixing height, the amount of activity by F-15Cs (or F-22As) is minimal compared to the overall use. Such low levels of sortie-operations would not contribute measurably to overall emissions.

Table 4.4-1. Baseline and Projected Emissions for Affected Alaskan SUA

	Baseline Emissions (tons/year)				
Affected Airspace[1]	*CO*	*VOCs*	*NO_x*	*SO_2*	*PM_{10}*
Galena MOA	0.015	0.005	0.60	0.001	0.001
Stony A MOA	1.16	0.35	42.52	0.10	0.14
	Projected Emissions (tons/year)				
Galena MOA	0.005	0.002	0.19	0.001	0.001
Stony A MOA	0.49	0.13	15.75	0.05	0.13

Note: 1. Airspace units with a floor below 2,000 feet AGL (mixing height).
CO = carbon monoxide; VOC = volatile organic compound; NO_x = nitrogen oxides; SO_2 = sulfur dioxide; PM_{10} = particulate matter less than 10 micrometers in diameter

4.4.3 Environmental Consequences of Beddown

Table 2.2-4 describes the existing and projected usage of the military training airspace under the Proposed Action. As discussed in Section 4.1.3.1, the projected change in aircraft operations represents an approximate 5 to 10 percent increase from the current use by the F-15Cs. Emission concentrations associated with F-22A aircraft operations would be minimal due to the flight altitudes and large size of the airspace units. Because these emissions would be dispersed over millions of acres, they would not measurably affect air quality (refer to Table 4.4-1). Emissions would decrease in both of the MOAs with floors below the mixing height (Galena and Stony A MOAs). These decreases would result from the lower amount of flying time F-22As would spend at altitudes below the mixing height compared to F-15Cs. This increase in flight altitude offsets potential emission increases from increased F-22A sortie-operations and higher F-22A aircraft emissions.

Of the primary MOAs, only operations within the Susitna MOA overlie a PSD Class I area: the Denali National Park and Preserve, where visibility must be protected and preserved. However, the floor of the Susitna MOA is 5,000 feet AGL or 10,000 feet MSL (whichever is greater). All operations in this MOA are above the mixing height and, therefore, would not affect air quality.

Alaska native Concerns

Emissions from aircraft operations would be transitory and dispersed over the extensive Alaskan SUA. Residents and visitors to Alaska Native villages and traditional subsistence areas underlying this airspace would not be able to detect any improvement in emissions associated with the Proposed Action.

4.4.4 No Action

Under the No Action Alternative, aircraft operations would not change from current conditions. Therefore, there would be no change to the current air quality.

4.5 Physical Resources

4.5.1 Definition

Physical resources are defined as the earth and water resources beneath the 18 MOAs and Restricted Areas that comprise the airspace used for air-to-air and air-to-ground training by the F-15C and F-15E and that are proposed for continued use by the F-22A. This 38.5 million acres of diverse geologic and hydrologic features can be separated into three generalized physiographic regions: the Interior, South Central, and Western regions.

4.5.2 Existing Conditions

Earth resources beneath the training airspace extend from the Brooks Range on the north to the Alaska Range in the interior part of the state. The airspace also covers a 650-mile arc from the Alaska Range almost to the Gulf of Alaska. The western portion of the airspace extends in a 150-mile swath from just south of the Yukon River at Galena to 50 miles north of Dillingham on Bristol Bay.

Portions of the Yukon MOA overlie the Porcupine Plateau, an area characterized by low ridges with gentle slopes and summits 1,500 to 2,500 feet high with a few 3,500-foot peaks. Valley floors are broad and valley patterns irregular, with many imperceptible divides. The central part of the Yukon and Viper MOAs (Yukon 1, 2, 3, 4, and Viper A/B) overlies the Yukon Flats region (Air Force 1995). The Yukon Flats region consists of marshy lake-dotted flats rising from 300 feet in altitude on the west to 600 to 900 feet on the north and east. The northern part of the flats is made up of gently sloping outwash fans of the Chandalar, Christian, and Sheenjek Rivers. The southeastern part of the flats is the broad gentle outwash fan of the Yukon River. Other areas are flat floodplains. Rolling silt and gravel-covered marginal terraces having sharp escarpments 150 to 600 feet high rise above the flats and slope gradually up to altitudes of about 1,500 feet at the base of surrounding uplands and mountains (U.S. Geological Survey [USGS] 2000). The southern portion of the Yukon MOA Complex (Yukon 1, 2, 3, 4, and 5, R-2205, and portions of the Birch, Buffalo and Eielson MOAs) overlies the Yukon-Tanana Upland (Air Force 1995).

The Yukon-Tanana Upland is characterized by rounded even-topped ridges. In the western part, these rounded ridges trend northwestward to eastward and have altitudes of 1,500 to 3,000 feet. The ridges are surmounted by compact rugged mountains 4,000 to 5,000 feet in altitude. Ridges in the eastern part are 3,000 to 5,000 feet in altitude and rise 1,500 to 3,000 feet above adjacent valleys. Valleys in the western part are generally flat, alluvium floored, and 0.25-0.50 mile wide to within a few miles of headwaters. No glaciers are in the region, but the entire section is underlain by discontinuous permafrost (USGS 2000). The Yukon 5, Birch, Buffalo and Eielson MOAs also overlie the Tanana-Kuskokwim Lowland and the Northern Hills. The lowland is a broad depression north of the foothills of the Alaska Range. The Tanana and Delta rivers, rising in the Alaska Range, flow north across the lowland at intervals of 5 to 20 miles. Thaw lakes and sinks are abundant in the lowlands. The Northern Foothills of the Alaska Range are flat-topped east-trending ridges 2,000 to 4,500 feet in elevation, 3 to 7 miles wide, and

5 to 20 miles long, and separated by rolling lowlands 700 to 1,500 feet high and 2 to 10 miles wide (Air Force 1995).

The south central region, beneath the Susitna and Fox MOAs, is bounded on the east by the St. Elias and Chugach mountains, which are breached only by the Copper River Valley; the Aleutian Range rises along the western boundary of the region. Relief is extreme, with lowlands near sea level and mountains rising up to 10,000 to 20,320 feet. The northern portion of Susitna MOA overlies the Alaska Range from Ruth Glacier and Mount Barrille (7,650 feet) at the northeast edge almost to the Kichatna Mountains and Mount Dall (8,756 feet) in the west. This area is very rugged, with numerous peaks over 7,000 feet. The Fox MOAs overlie the central part of the Alaska Range in the north, the Clearwater Mountains in the center, the foothills of the Talkeetna Mountains in the southwest, and the Gulkana Upland and Copper River Lowland in the southeast. The central part of the Alaska Range contains ridges 6,000 to 9,000 feet high, surmounted by peaks over 9,500 feet in elevation, including Mount Deborah (12,329 feet), Mount Moffit (13,020 feet), and Mount Hayes (13,832 feet). The range rises abruptly from lower country on either side (Air Force 1995).

The western training airspaces (Galena, Stony, Naknek MOAs) overlie the Kuskokwim Mountains, the Tanana-Kuskokwim lowlands and the Holitna lowlands. The Tanana-Kuskokwim lowland is a broad depression bordering the Alaska Range on the north. Braided glacial streams rising in the Alaska Range flow northward across the lowland. Thaw lakes are present in areas of fine alluvium and the entire area consists of permafrost (USGS 2000). The Holitna lowland, ranging in elevation from 250 to 600 feet, occupies the southeastern portion of the upper Kuskokwim Basin and is bounded to the south by the Taylor Mountains-Nushagak Hills. At the western edge of the Holitna lowland, about halfway along its length, the Kuskokwim River cuts through the Kuskokwim Mountains in a gorge 100 to 400 feet deep, which lies within an older valley approximately 1,000 feet deep and 2 to 8 miles wide (Air Force 1995).

Water resources beneath the Yukon, Viper, Buffalo, Eielson, and Birch MOAs, in the interior region of Alaska, include a large system of streams and small rivers that feed into the Yukon River. Major drainage basins include the Porcupine River, Tanana River, and Upper and East Central Yukon basins (USGS 2000). Tributary to the Yukon River also are the Black and Little rivers below the Yukon 5 MOA, while the Fortymile, Ladue, Kandik, Nation, and Tatonduk rivers drain the area below the rest of the Yukon and Viper MOAs. Many of the terraces, broad alluvium-filled basins, and plateaus in the region are populated with thaw lakes. Oxbow lakes are common along the Yukon River (Air Force 1995).

Beneath the Fox and Susitna MOAs, in the South Central region of Alaska, water resources include the drainage basins associated with the Kichatna, Yenta, Kahiltna and Chulitna rivers. Beneath the Susitna MOA the rivers drain south out of the Alaska Range eventually discharging into Cook Inlet. Water resources beneath the Fox MOAs are split between the Tanana River drainage basin which flows north into the Yukon River and the Susitna drainage basin (Air Force 1995).

The western MOAs (Galena, Stony, and Naknek) are located across a broad portion of Alaska ranging from the Galena MOA just south of the Yukon River to the Naknek MOAs just north of Bristol Bay. Beneath the Galena MOA are the Sultatna, Susulanta, Nowitna, and Nixon Fork rivers, which all drain to the Yukon River. Beneath the Stony MOA is the Kuskokwim River, which flows through a wide, forested floodplain, which is interlaced with lakes, sloughs, and oxbows and incised into the Tanana-Kuskokwim lowlands. The Kuskokwim River finally discharges to Kuskokwim Bay and the Bering Sea. The Mulchatna and Nushagak rivers drain the area beneath the Naknek MOAs discharging into Bristol Bay at Dillingham (Air Force 1995).

The offshore warning area W612 is presented on Figure 1.1-2. W612 is not scheduled for normal F-22A training. MTRs presented in Figure 2.2-4 are expected to be used by F-22A aircraft less than 40 percent of the time they are currently used by F-15E aircraft. Physical resources under these MTRs are comparable to those under nearby MOAs.

4.5.3 Environmental Consequences of Beddown

Beddown of two F-22A squadrons in place of one F-15C and one F-15E squadrons will not substantially change airspace use or training above the physical resources. The F-22A squadrons will spend more training time at higher altitudes than either the F-15C or F-15E squadrons. The F-22A would train with defensive countermeasures in existing airspace comparable to current F-15C and F-15E training. Training chaff and flares would be used in accordance with the operational procedures outlined in Section 2.2.3.

The only potential variation in physical effects is the difference in chaff used by F-22A and that used in F-15C and F-15E training. As described in Appendix A, all chaff consists of fine segments (thinner than a human hair) of aluminum-coated silica cut to lengths of 1/2 to 2 or more inches to reflect radar signals from threats to aircraft. The amount of chaff distributed within the airspace would amount to fewer than 0.015 grams (0.0005 ounces) per acre per year. Chaff rapidly breaks up to become indistinguishable from native soils. Chaff use or the increase of chaff use would not be able to be discerned in the environment and would not produce a significant effect upon water or soils under the airspace. The same number of plastic and nylon pieces would fall to the ground after flare deployment. With the F-22A chaff, each bundle of chaff has an additional three 2-inch by 4-inch pieces of mylar wrapping that drift to the ground. These pieces are similar to the plastic pieces that come from current chaff use. The mylar wrapping is similar to and thinner than the aluminum-coated mylar pieces that fall when flares are deployed. These materials are inert and are not expected to be concentrated in any way that could impact soil or water resources.

The number of flares proposed to be used in training is the same as the current flare usage. Flares are not projected to be a fire risk due to the altitude constraints placed on their use as described in Chapter 2.0. Flare debris consist of 1-inch by 1-inch plastic or nylon parts, aluminum-coated mylar wrapping materials, and a medium hailstone-sized plastic S&I device. These pieces are inert, do not pose a risk to humans or animals under the airspace (see Section 4.3.2).

Alaska Native Concerns

The local economy in many of the villages is dependent on natural resources. Based on past indications and scoping comments for this EA, Alaska Natives may be concerned if game in traditional hunting areas were affected. There are no anticipated physical effects that could impact natural resources or game under the airspace.

4.5.4 No Action

The No Action Alternative would not change use of the training airspace and expenditure of defensive countermeasures would not change from the current conditions. There would be no adverse effect to the earth and water resources beneath the airspace.

4.6 Biological Resources

4.6.1 Definition

Biological resources include vegetation and habitat, wetlands, fish and wildlife, and special-status species (on lands under SUA). Section 3.6.1 explains these resources in more detail. Table 4.6-1 identifies the relationship between special-status species and the Alaskan training airspace used by F-15C and F-15E pilots and proposed for use by F-22A pilots. The ROI for training airspace in Alaska includes all lands under the MOAs currently used by the F-15Cs and F-15Es at Elmendorf AFB.

4.6.2 Existing Conditions

Existing training airspace used by Elmendorf AFB occurs primarily in MOAs and ATCAAs, which overlie approximately 38.5 million acres. Depending on the MOA and overlying ATCAA, training may currently be authorized from 500 feet AGL to above 60,000 feet MSL. In some MOAs, supersonic flight is authorized above 5,000 feet AGL and occurs about 7.5 percent of the F-15C and F-15E training time. The F-15C and F-15E operate between 10,000 and 30,000 feet MSL two-thirds of the time (see Table 2.2-3). W-612 is not planned for substantial F-22A training and MTR training would be reduced to 40 percent of current use. For these reasons, the focus of this analysis is the SUA proposed for F-22A training.

Vegetation. The existing training airspace overlies the Upland Tundra and Boreal Forest ecoregions (Bailey 1995). Predominant land cover types are forests (60 percent), fields (17 percent), and tundra (15 percent) (Air Force 2001a). Forest types are largely evergreen and mixed conifer/deciduous. Over 8.1 million acres of special use areas occur under these MOAs. This includes National Wildlife Refuges under the Galena and Yukon 2, 4, and 5 MOAs and Denali National Park and Preserve under portions of the Susitna MOA, which are discussed in Section 4.8.2.

In Alaska, wetlands cover over 43 percent of the state's land, in contrast with the lower 48 states, where they occupy 5.2 percent. About 1,952,000 acres of aquatic habitats and wetlands occur under the existing training airspace (Air Force 2001a). Wetland types under the airspace are largely deciduous, evergreen, and mixed forest wetlands.

Fish and Wildlife. Common fish and wildlife species under the existing airspace are similar to that described in Section 3.6.2. Regionally important game species include moose, caribou (*Rangifer tarandus*), Dall's sheep (*Ovis dalli*), bears, and various species of waterfowl. Moose, caribou, and Dall's sheep have critical lambing/calving, wintering, and rutting areas underneath the training airspace. The Air Force has existing airspace restrictions that prevent potential overflight effects on these and other wildlife species (Air Force 1995).

Special-Status Species. Special-status species include species designated as threatened, endangered, or candidate species by state or federal agencies. There are no federally listed threatened or endangered species that occur under lands of the existing training airspace (Table 4.6-1). Five Alaska species of special concern likely occur in the ROI. These are peregrine falcon, olive-sided flycatcher, gray-cheeked thrush, blackpoll warbler, and Townsend's warbler. Habitat requirements of these species are discussed in Section 3.6.2.

Table 4.6-1. The Relationship of Special-Status Species to Training Airspace

Common Name	*Scientific Name*	*Status*	*Occurrence under Training Airspace*
Aleutian shield fern	*Polystichum aleuticum*	FE	No
Chinook salmon (Fall stock from Snake River)	*Oncorhynchus tshawytscha*	AK SSC	No
Leatherback sea turtle	*Dermochelys coriacea*	FE	No
Short-tailed albatross	*Phoebastria albatrus*	FE, AKE	No
Kittlitz's murrelet	*Brachyramphus brevirostris*	FC	No
Eskimo curlew	*Numenius borealis*	FE, AKE	Unlikely; species is considered extinct
Spectacled eider	*Somateria fisheri*	FT, AK SSC	No
Stellar's eider (AK breeding population)	*Polysticta stelleri*	FT, AK SSC	No
Aleutian Canada goose	*Branta canadensis leucopareia*	AK SSC	No
Peregrine falcon	*Falco peregrinus*	AK SSC	Yes
Northern goshawk (southeast AK population)	*Accipiter gentilis laingi*	AK SSC	No
Olive-sided flycatcher	*Contopus cooperi*	AK SSC	Yes
Gray-cheeked thrush	*Catharus minimus*	AK SSC	Yes
Townsend's warbler	*Dendroica townsendi*	AK SSC	Yes
Blackpoll warbler	*Dendroica striata*	AK SSC	Yes
Brown bear (Kenai Peninsula population)	*Ursus arctos horribilis*	AK SSC	No
Sea otter (southwest Alaska distinct population segment)	*Enhydra lutris kenyoni*	FT, AK SSC	No
Harbor seal	*Phoca vitulina*	AK SSC	No
Stellar sea-lion	*Eumetopias jubatus*	FT=eastern population, FE=western population AK SSC	No
Bowhead whale	*Balaena mysticetus*	FE, AK SSC	No
Finback whale	*Balaenoptera physalus*	FE	No
Humpback whale	*Megaptera novaeangliae*	FE, AKE	No
Right whale	*Eubalaena glacialis*	AKE	No
Blue whale	*Balaenoptera musculus*	AKE	No
Beluga whale (Cook Inlet population)	*Delphinapterus leucas*	AK SSC	No

FE = Federal Endangered; FT = Federal Threatened; FC = Federal Candidate; AKE = State of Alaska Endangered; AK SSC = State of Alaska Species of Special Concern.

Sources: Alaska Department of Fish and Game 2005a and 2005b, United States Fish and Wildlife Service (USFWS) 2005.

4.6.3 Environmental Consequences of Beddown

There will be no construction or ground-disturbing consequences associated with the training airspace for the Proposed Action. Therefore, no impacts would occur to vegetation and no wildlife habitat would be lost under the training airspace.

No changes to the existing training airspace would occur under the Proposed Action. The higher flight characteristics and mission requirements of the F-22As would result in somewhat different use of the airspace when compared to the current F-15Cs and F-15Es. The F-22As are expected to generally fly at higher altitudes, with less than 5 percent occurring below 5,000 AGL and 30 percent above 30,000 AGL. This reduction in use at the lower elevations would result in lower overall noise levels from subsonic aircraft noise. The F-22As would fly at supersonic speed approximately 25 percent of the time or three times as often as the F-15Cs and F-15-Es. F-22A supersonic flight would typically occur at higher altitudes. The sonic booms generated at higher altitudes will produce less overpressure on the ground. F-22A training would result in an increased number of sonic booms per month under specific MOAs. Section 4.2.3 provides details on aircraft noise associated with the proposed F-22A training beddown. F-22A training on MTRs would be projected to be one-half the current F-15E MTR training.

During scoping, the public expressed specific concern for noise impacts on those species that are hunted in Alaska. Moose, caribou, and Dall's sheep are important game species in Alaska, and critical calving grounds are located under the training airspace. Several studies have documented the reaction and effects to ungulates exposed to military aircraft overflights. Responses reported ranged from no reaction and habituation to panic reactions followed by stampeding (Weisenberger *et al.* 1996; see reviews in Manci *et al.* 1988). Although few studies have evaluated the effect of military overflights on moose, several have studied the effect on caribou. A recent study in Alaska documented only mild short-term reactions of caribou to military overflights in the Yukon MOAs (Lawler *et al.* 2005). A large portion of the Fortymile Caribou Herd calves underneath the Yukon MOAs. Lawler *et al.* (2005) concluded that military overflights did not cause any calf deaths, nor did cow-calf pairs exhibit increased movement in response to the overflights. In contrast, Maier *et al.* (1988) found that cow-calf pairs of the Delta Caribou Herd in interior Alaska that were exposed to low-altitude overflights moved about 2.5 km more per day than those not exposed (Maier *et al.* 1998). The authors, however, stated that this distance was of low energetic cost. Harrington and Veitch (1991) expressed concern for survival and health of woodland caribou calves in Labrador, Eastern Canada, where military training flights occur over 100 feet AGL. Over 98 percent of F-22A training flights would be above 2,000 feet (see Section 2.2)

Beckstead (2004) reported on a study of the effects of military jet overflights on Dall's sheep under the Yukon 1 and 2 MOAs in Alaska. The study could find no difference in population trends, productivity, survival rates, behavior, or habitat use between areas mitigated and not mitigated for low-level military aircraft by the Alaska MOAs Environmental Impact Statement (EIS) (Air Force 1995). In the mitigated area, flights are restricted to above 5,000 feet AGL during the lambing season, while the unmitigated area could experience flights as low as 100 feet AGL. The F-22A does not fly below 500 feet and is above 5,000 feet 95 percent of the training time.

These and studies on noise effects to other wildlife species are reviewed in Appendix E. Based on previous research, current flight restrictions over calving/lambing grounds (Air Force 1995), and the relatively unchanged noise levels associated with the proposed F-22A training, noise associated with the F-22A beddown at Elmendorf AFB would have similar impacts on wildlife as exist under baseline conditions. Some animals may startle in response to a sonic boom. However, most animals under the training airspace have been previously exposed to sonic booms from F-15Cs, F-15Es, and other training aircraft and are likely habituated to the sound (see Appendix E).

Use of training chaff and flares is expected to continue with the F-22A replacing some F-15C and F-15E aircraft training in the airspace. Chaff and flare use is projected to remain the same as under current conditions. F-22A chaff has three additional pieces (mylar) that fall to the ground. There would be no change in the minimum altitude or seasonal restrictions on flare release. The potential environmental consequences and characteristics of chaff and flares are reviewed in Appendices A and B. Specific issues reviewed are the potential for and consequences of (1) ingestion of chaff fibers or chaff or flare plastic, nylon, or mylar materials; (2) inhalation of chaff fibers; (3) physical external effects from chaff fibers, such as skin irritation; (4) effects on water quality and forage quality; (5) increased fire potential; and (6) potential for being struck by medium hailstone-sized flare debris. This review demonstrates that no reports or studies to date have documented negative impacts of training chaff or flares to biological resources. Chaff and flares are regularly used in approved Alaskan SUA. Therefore, no impacts to biological resources would be expected with the continued use of training chaff and defensive flares in the Alaska training airspace.

Alaska Native Concerns

The local economy in many of the villages is dependent on the resources of terrestrial communities described above. Alaska Natives expressed concerns during scoping that existing and projected noise levels and sonic booms could affect game species in traditional hunting areas. As described above, terrestrial resources under the Alaskan SUA that are used by a number of Alaska Native villages in traditional subsistence activities are not expected to be adversely affected by the change from F-15C and F-15E training to F-15C and F-22A training.

4.6.4 No Action

Under the No Action Alternative, two squadrons of F-22A would not beddown at Elmendorf AFB. Airspace training would remain the same as under current conditions. F-15C and F-15E aircraft would continue to train in the airspace at supersonic speeds and use chaff and defensive flares. Biological resources would not change from existing conditions.

4.7 Cultural Resources

4.7.1 Definition

Cultural resources are any prehistoric or historic district, site, building, structure, or object considered important to a culture or community for scientific, traditional, religious or other purposes. For more information on the definition of cultural resources as they apply to the base and environs, see Section 3.7. Section 3.7.2 presents treatment of the local and regional historical setting.

The ROI for cultural resources is the area within which the Proposed Action has the potential to affect existing cultural resources. For the Proposed Action, the ROI is defined as the lands beneath training airspace used by the Elmendorf-based F-15C and F-15E aircraft.

4.7.2 Existing Conditions

Archaeological sites under training airspace include native burial grounds, village and settlement sites, and historic mining sites (Air Force 1991a). Architectural resources under the proposed MOAs include structures relating to gold mining, trapping, or the railroad (Air Force 1991). In addition to National Register of Historic Places (NRHP)-listed sites, there are likely to be additional cultural resources that are either eligible or potentially eligible for NRHP listing under airspace.

Galena MOA

There are no NRHP-listed cultural sites under the Galena MOA. However, connecting trails of the Iditarod National Historic Trail are located under the MOA. The Iditarod Trail is a network of more than 2,300 trails which takes its name from an Athabascan Indian village. Trails used by the Ingalik and Tanaina Indians and Russian fur traders were improved by miners in the early 1900s. The trails were heavily used by miners until 1924 when airplanes came into use (Bureau of Land Management [BLM] 2000). In 1925, dog teams and drivers gained national attention when they delivered diptheria serum from Nenana to Nome in 127 hours along the trail. The annual Iditarod race retraces the route.

Stony A/B MOA

The Stony A and B MOAs lie above the Kolicachuk, Upper Kuskokwim and Deg Hit'An language regions (Alaska Native Knowledge Network 2000). There are two NRHP-listed resources under the Stony A,B MOAs. The Kolmakov Redoubt Site is in the Sleetmute area under Stony B. Sts. Constantine and Helen Chapel is in Lime Village under Stony A (National Register Information Service [NRIS] 2000).

Federally recognized Alaska Native villages under or near the airspace are: Crooked Creek, Georgetown, Lime Village, Red Devil, Sleetmute, and Stony River (Bureau of Indian Affairs 2000). The Regional Native Corporation for the area is Calista.

Crooked Creek was reported by a Russian explorer in 1844 as "Kvikchapak" in Yup'ik and "Khottylno" in Ingalik (Alaska Department of Community and Economic Development [DCED] 2000). At that time the site was used as a summer fish camp for the Kwigiumpainukamuit villagers. A permanent settlement was established there in 1909 as a way-station for the Flat and Iditarod gold camps. A trading post was founded in the upper village (upriver from the creek mouth) in 1914, and a post office and school were built in the late 1920s. The lower village was settled by Eskimo and Ingalik people. Native lifestyle is based on subsistence activities including salmon, moose, caribou, and waterfowl (Alaska DCED 2000). Both parts of the village remain today.

Georgetown is on the north bank of the upper Kuskokwim River in the Kilbuck-Kuskokwim Mountains. Europeans first entered the middle Kuskokwim area in 1844 when the Russian explorer Zagoskin sailed upriver to McGrath. At that time, Georgetown was a summer fish camp for residents of Kwigiumpainukamuit and was known as Keledzhichagat (Alaska DCED 2000). Gold was found along the George River in 1909 and the mining settlement of Georgetown was named for three traders. The town grew to about 200 cabins and several stores. By 1953, only one large structure from the mining era remained: a two-story cabin that belonged to George Fredericks. The present settlement developed in the 1950s. A state school was established in 1965 and remained until 1970. Georgetown is presently used as a seasonal fishing camp. It has no year-round residents (Alaska DCED 2000).

Lime Village is on the south bank of the Stony River south of McGrath. It is a Dena'ina Athabascan Indian settlement that was settled by Europeans in 1907. Residents of nearby Lake Clark used the location as a summer fishing camp (Alaska DCED 2000). The 1939 U.S. Census called the settlement Hungry Village. Sts. Constantine and Helen, a Russian Orthodox chapel was built there in 1960 and a state school constructed in 1974 (Alaska DCED 2000). Presently, subsistence is based on hunting and gathering with some seasonal work in fire fighting and trapping.

Red Devil is located on both banks of the Kuskokwim River at the mouth of Red Devil Creek. The village was named after the Red Devil mercury mine established in 1921. The mine continued to operate until 1971 (Alaska DCED 2000). The village is a mix of Eskimo, Athabascan, and non-native inhabitants who supplement their income with subsistence activities.

Sleetmute is on the east bank of the Kuskokwim River. It is an Ingalik Indian village that has also been known as Sikkiut, Steelmut, and Steitmute (Alaska DCED 2000). A Russian trading post was built at the nearby Holitna River junction 1.5 miles away, but was moved farther downriver in 1841. Another trading post was started at Sleetmute in 1906. A school and post office opened in the 1920s and a Russian Orthodox church was built in 1931 (Alaska DCED 2000).

Stony River, also known as Moose Village and Moose Creek, is on the north bank of the Kuskokwim River near its junction with the Stony River. It began as a trading post and riverboat landing supplying mining operations to the north (Alaska DCED 2000). The first trading post and post office were opened during the 1930s, and area natives established residency there in the 1960s. The village is a mix of Athabascan and Eskimo people who depend heavily on a subsistence economy.

Susitna MOA

No NRHP-listed cultural resources are under this MOA (NRIS 2000). No federally recognized Alaska Native villages are located under Susitna airspace (Bureau of Indian Affairs 2000).

Naknek 1/2 MOAs

There are no NRHP-listed resources under the Naknek MOAs (NRIS 2000). One federally recognized Alaska Native village, Koliganek, lies under the edge of Naknek 1 airspace (Bureau of Indian Affairs 2000).

Koliganek is on the Nushagak River north of Dillingham. First contact with Europeans occurred in the early 19th century when Russian fur traders entered the area. Prior to its present location, the village was on Tikchik Lake near the headwaters of the Nuyakuk River (Bristol Bay Native Association 2000). Archaeological excavations indicate the site was occupied from about 1820 until the turn of the 19th century by people who practiced a coastal Bering Sea Eskimo lifeway, hunting sea mammals, fishing, and trapping on land (Bristol Bay Native Association 2000). After a flu epidemic, residents moved to the confluence of the Nuyakuk and Nushagak Rivers (Old Koliganek). A Russian Orthodox church, St. Yako, was established in the village in 1870. The residents moved to another site in 1938 (Middle Koliganek) because of a decreasing supply of firewood near the village. The present site was established in 1964. Residents depend on the Bristol Bay commercial salmon fishery and fur trapping. The Koliganek Traditional Council is the governing body for the Native residents of Koliganek (Bristol Bay Native Association 2000). The Regional Native Corporation is the Bristol Bay Native Corporation.

Fox MOAs

Although there are no Alaska Native Villages within this area, there are scattered remote residences and BLM-managed recreation areas. The area is frequently used for subsistence and recreational hunting (BLM 2006). Additionally, the NRHP-listed Tangle Lakes Archaeological district is located on lands underlying the Fox MOA. The district contains more than 400 recorded archaeological sites spanning 10,000 years of human presence in the region (BLM 2006).

Birch, Buffalo, Eielson, and Viper MOAs

No NRHP-listed cultural resources underlie these MOAs (NRIS 2006) The Regional Native Corporation for the area is Doyon; however, no federally recognized Alaska Native villages are located under these MOAs.

Yukon MOAs

The Yukon MOAs overlie a large area to the north and east of Fairbanks. They are with Doyon Regional Native Corporation. Several native villages occur in this area, as well as NRHP resources.

The small village of Healy Lake, 29 miles east of Delta Junction, is under the Yukon 1 MOA. Healy Lake is home to the federally recognized Healy Lake Village Council. Predominant activity in the area is the recreational use of Healy Lake during summer months.

The village of Circle underlies Yukon 2 MOA, on the south bank of the Yukon River at the edge of the Yukon Flats National Wildlife Refuge, about 160 miles northeast of Fairbanks. The federally recognized Circle Native Community is predominantly Athabaskan. Circle, or Circle City, was established in 1893 as a supply point for goods shipped up the Yukon River and then to the gold mining camps. By 1896, Circle was the largest mining town on the Yukon, with a population of 700. Residents, some of whom are part-time, now number approximately 100. The Coal Creek Historic Mining District is on the NRHP.

The federally recognized Alaska Native Village of Eagle underlies Yukon 3 MOA, six miles west of the Alaska Canadian border. It is located on the Taylor Highway, on the left bank of the Yukon River at the mouth of Mission Creek. The area has been the historical home to Han Kutchin Indians, and was once known by non-Native Alaskans as "Johnny's," after a leader named John. The adjacent community of Eagle saw its beginnings around 1874 as a log house trading station. Named "Belle Isle", the station continued to provide supplies and trade goods for prospectors who worked the upper Yukon and its tributaries until Eagle City was founded at the site in 1897. Fort Egbert was established adjacent to Eagle in 1899; a major accomplishment was construction of part of the Washington-Alaska Military Cable and Telegraph System in 1903. Eagle was incorporated in 1901, becoming the first incorporated city in the Interior. Several NRHP properties occur in or near Eagle, including the Eagle Historic District, Woodchopper Roadhouse, the Frank Slaven Roadhouse, the Steele Creek Roadhouse, the George McGregor Cabin and the Ed Beiderman Fish Camp (NRIS 2006). Eagle is listed in the NRIS as the location of the Chicken Historic District, but it is 66 miles south of Eagle on the Taylor Highway.

The Alaska Native Village Chalkyitsik underlies Yukon 5 MOA. Archaeological excavations indicate this region may have been first used as early as 12,000 years ago. This village on the Black River has traditionally been an important seasonal fishing site for the Gwich'in. Village elders remember a highly nomadic way of life where from autumn into the spring they lived at the headwaters of the Black River, and fished downriver in the summer. Contact with early explorers was limited, and the Black River Gwich'in receive scant mention in early records. The location of the village at its present site is due in part to low water in the Black River in the 1930s. A boat carrying materials intended for a school to be built in Salmon Village had to be unloaded at the Chalkyitsik seasonal fishing camp that then consisted of four cabins. Rather than reload the construction materials, the school was built at Chalkyitsik, and the Black River people began to settle around the school.

4.7.3 Environmental Consequences of Beddown

Beddown of F-22A aircraft at Elmendorf AFB would replace some F-15C and F-15E aircraft that currently train in the airspace with F-22A aircraft. A summary of federal regulations and guidelines established for the management of cultural resources is presented in Section 3.7.

No impacts to historic properties under the airspace are expected as a result of the proposed F-22A beddown. Chaff and flare use are not expected to impact historic properties under the airspace. The F-22A would conduct similar missions and training programs to those conducted by F-15C and F-15E aircraft currently located at Elmendorf AFB. The increase in mylar pieces associated with F-22A chaff is not projected to impact historic properties. All F-22A activities would take place in the same airspace currently used by the base. There would be less air-to-ground munitions use on approved Army ranges with the F-22A as compared to the F-15E.

Traditional Cultural Properties and Alaska Native Concerns

A number of Alaska Native villages and traditional subsistence areas underlie Alaskan SUA (see Figure 4.7-1). The figure also includes the boundaries of the private Native Alaska regional corporations. This EA analysis considers the Alaska Native villages and their local economies based primarily on subsistence hunting and resource extraction for marketable products. During scoping comments, Alaska Natives expressed concern that existing and projected noise levels and sonic booms could affect game in traditional hunting areas and potentially impact the local economy dependent on these resources. During meetings held at Lime Village and Sleetmute under the Stony MOA for the Initial F-22 Beddown (Air Force 2001), Alaska Natives involved with subsistence hunting did not see noise as impacting game species (Air Force 2001a). Refer to Appendix E for a review of the potential effects of aircraft noise on biological resources. No traditional cultural properties have been specifically identified underneath the airspace. However, this does not mean that none are present.

The annual average noise levels under the MOAs are not expected to noticeably change as a result of F-22A training. The typical higher altitudes for F-22A training are likely to reduce average noise levels. The number of supersonic events is expected to increase as a result of the increased flight time of the F-22A above supersonic speeds. As noted in Section 4.2.3, these additional booms could disturb or increase annoyance among residents or users of resources under the Stony MOAs. This change would likely be discernible to Alaska Natives or others residing under or using the land under the airspace for an extended period of time. As noted in Section 4.6.3, game and other subsistence species have previously experienced sonic booms and are likely habituated to them. For any damage claims associated with sonic booms, the Air Force has established procedures that begin with contacting the Elmendorf AFB Public Affairs Office. The increased number of sonic booms as a result of training is not expected to significantly affect cultural resources or Alaska Native activities.

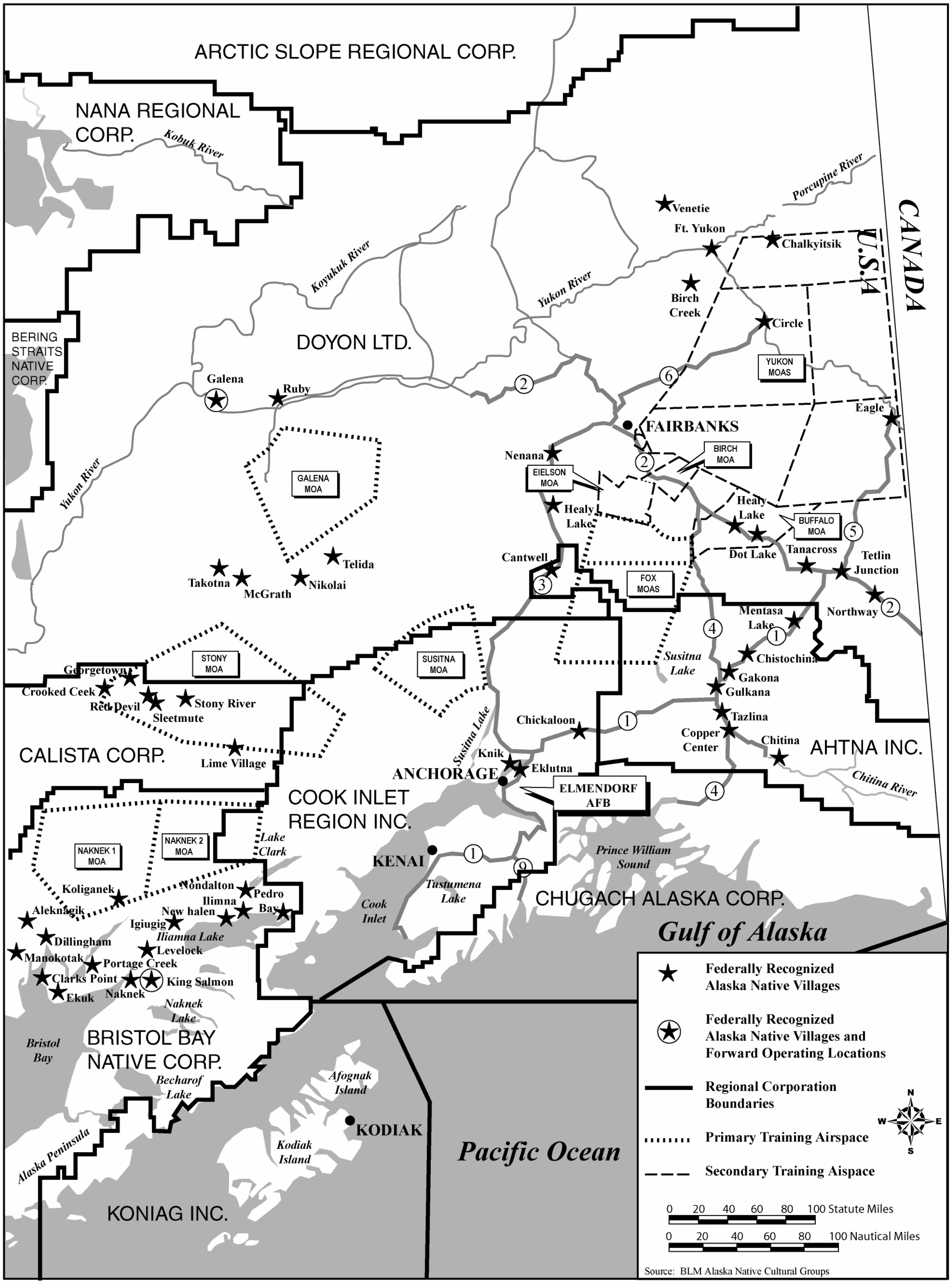

Figure 4.7-1. Alaska Native Villages in the Airspace Environment

Air Force airspace managers currently identify and mitigate where possible use of specific airspaces during hunting seasons to avoid significant impacts to Alaska Native resources. This practice would continue for the proposed F-22A beddown. No significant impacts to traditional cultural properties or Alaska Native activities are anticipated to result from the proposed beddown.

4.7.4 No Action

Under the No Action Alternative, the F-22A would not beddown at Elmendorf AFB. Existing military flight training would continue under this alternative and resources would continue to be managed in compliance with federal law and Air Force regulation.

4.8 Land Use and Recreation

4.8.1 Definition

Land use addresses general land use patterns, land ownership, land management plans, and special use areas under the SUA. General land use patterns characterize the types of uses within a particular area such as forests, residential, military, and recreational. Land ownership is a categorization of land according to type of owner. The major land ownership categories include state, federal, Alaska Native corporations, and other private landowners. Federal lands are described by the managing agency, which may include the USFWS, the U.S. Forest Service, BLM, or DoD. State of Alaska land under the study area is typically managed by the Departments of Fish and Game or Natural Resources. The land management plans include those documents prepared by agencies to establish appropriate goals for future use and development. As part of this process, sensitive land use areas are often identified by agencies as being worthy of more rigorous management. As noted in Section 4.1.1, FAA administers all navigable airspace above public and private lands.

Recreation resources consider outdoor recreational activities that take place away from the residences of participants. This includes natural resources and man-made facilities that are designated or available for public recreational use in remote areas. As part of the mitigations identified for the MOA EIS ROD, the Air Force participates in the Resource Protection Council to work with agencies, Alaska Natives, and others in the identification and mitigation of potential consequences to environmental resources (Air Force 1995).

The ROI for land use and recreation consists of all the lands under the existing training airspace used for Elmendorf F-15C and F-15E training.

4.8.2 Existing Conditions

The general land use patterns underlying this airspace may be characterized as very rural. There are large public land areas as well as some agricultural forested areas. There are also a number of small towns and villages throughout the area that occur along roads and highways, as well as in remote areas accessible only by waterways or small planes. Within populated areas, a variety of land use types occur, including residential, commercial, industrial, and public lands.

Special use areas provide recreational activities (trails and parks), hunting, fishing, and/or solitude or wilderness experience (parks, forests, and wilderness areas). Table 4.8-1 identifies special use areas under the airspace units. Figures 4.8-1 and 4.8-2 present these special use areas under or near training airspace. For the purpose of this EA, Alaska Native regional corporation private lands and village statistical areas are included with recreational areas. This broad grouping of special use areas includes large public land areas such as state or national parks, forests, and reserves which may include individual campgrounds, trails, and visitor centers. This broad definition of special use areas also includes large private land areas under the airspace.

Galena and Susitna MOAs

Special use areas of note underlying the Alaskan airspace include designated wildlife areas, trails, and parks. The Nowitna National Wildlife Refuge under the Galena MOA is managed by the USFWS. This refuge encompasses forested lowlands, hills, lakes, marshes, ponds, and streams and the nationally designated Nowitna River. The refuge was established to protect waterfowl and their habitat. Hunting, fishing, and river floating are recreational activities within the refuge.

Segments of the Iditarod National Historic Trail underlie the Galena and Susitna MOAs (Air Force 1995). The Iditarod Trail is a network of more than 2,300 trails that takes its name from an Athabascan Indian village.

A portion of Denali State Park, about 550,000 acres of Denali National Park, and about 400,000 acres of Denali National Preserve also underlie the northern portion of the Susitna MOA. Denali National Park, managed by the National Park Service, was established in 1917 as Mount McKinley National Park. In 1980, the Alaska National Interest Lands Conservation Act expanded the boundary by 4 million acres and re-named it Denali National Park and Preserve. Denali is currently 6 million acres in size. There are three distinct units that make up Denali National Park and Preserve: Denali Wilderness, Denali National Preserve, and Denali National Park. The Susitna MOA does not overlie the Denali Wilderness.

Fox and Stony MOAs

Lands underlying the Fox MOA include the Tangle Lakes, Tangle River, Delta River, Gulkana River, components of the National Wild and Scenic River System, Tangle Lakes Archaeological District, and Nelchina Public Use Area. Although there are no communities within this area, there are scattered remote residences. The Fox MOA overlies areas frequently used for recreational hunting, including BLM-managed recreation areas.

Stony A and B MOAs overlie a number of small communities including Georgetown, Crooked Creek, Red Devil, Sleetmute, and Stony River (see Section 4.7.2).

Yukon and Viper MOAs

The Yukon MOAs overlie remote residences or parcels along the Salcha River, as well as the communities of Circle, Central, Circle Hot Springs, Chena Hot Springs, Eagle, Chicken, Eagle Village, Boundary, and Chalkyitsik. Some of the special use areas within this area include the Yukon-Charley Rivers National Preserve, Charley National Wild River, and Fortymile National Wild, Scenic, and Recreational River. Notices along these rivers, such as the Birch Creek Wild and Scenic River, explain the SUA and the use of the airspace to recreationists.

Table 4.8-1. Special Use Areas within F-22A Airspace (Page 1 of 3)

Airspace	Special Use Area	Designation	Total Area of Airspace (acres)	Total Area of Special Use Area (acres)	Special Use Area Within Airspace (acres)	% of Special Use Area Within Airspace	% of Airspace Which is Special Use Area
Birch MOA	Birch Lake State Recreation Site	State Recreation Area	359,488	204	204	100.00	0.06
Birch MOA	Doyon	Alaska Native Regional Corp.	359,488	127,831,010	359,488	0.28	100.00
Buffalo MOA	Doyon	Alaska Native Regional Corp.	1,398,549	127,831,010	1,289,746	1.01	92.22
Buffalo MOA	Healy Lake	Alaska Native Village Statistical Area	1,398,549	109,933	108,803	98.97	7.78
Eielson MOA	Doyon	Alaska Native Regional Corp.	611,159	127,831,010	611,159	0.48	100.00
Fox 1 MOA	Doyon	Alaska Native Regional Corp.	968,360	127,831,010	968,360	0.76	100.00
Fox 2 MOA	Doyon	Alaska Native Regional Corp.	79,544	127,831,010	79,544	0.06	100.00
Fox 3 MOA	Ahtna	Alaska Native Regional Corp.	3,142,055	18,407,946	861,045	4.68	27.40
Fox 3 MOA	Cook Inlet	Alaska Native Regional Corp.	3,142,055	21,308,085	896,648	4.21	28.54
Fox 3 MOA	Doyon	Alaska Native Regional Corp.	3,142,055	127,831,010	1,384,361	1.08	44.06
Fox 3 MOA	Gulkana Wild & Scenic River	Wild and Scenic River	3,142,055	105,257	5,414	5.14	0.17
Galena MOA	Doyon	Alaska Native Regional Corp.	3,314,834	127,831,010	3,314,836	2.59	100.00
Galena MOA	Nowitna National Wildlife Refuge	National Wildlife Refuge	3,314,834	2,019,411	612,935	30.35	18.49
Naknek 1 MOA	Bristol Bay	Alaska Native Regional Corp.	3,294,225	26,195,347	3,251,606	12.41	98.71
Naknek 1 MOA	Koliganek	Alaska Native Village Statistical Area	3,294,225	62,162	44,179	71.07	1.34
Naknek 1 MOA	Wood-Tilchik State Park	State Park	3,294,225	515,427	395,979	76.83	12.02
Naknek 2 MOA	Bristol Bay	Alaska Native Regional Corp.	2,339,458	26,195,347	1,832,356	6.99	78.32
Naknek 2 MOA	Cook Inlet	Alaska Native Regional Corp.	2,339,458	21,308,085	505,018	2.37	21.59
Stony A MOA	Calista	Alaska Native Regional Corp.	3,430,001	33,099,981	1,939,436	5.86	56.54
Stony A MOA	Cook Inlet	Alaska Native Regional Corp.	3,430,001	21,308,085	552,642	2.59	16.11
Stony A MOA	Doyon	Alaska Native Regional Corp.	3,430,001	127,831,010	908,096	0.71	26.48
Stony A MOA	Lime Village	Alaska Native Village Statistical Area	3,430,001	34,186	33,007	96.55	0.96

Table 4.8-1. Special Use Areas within F-22A Airspace (Page 2 of 3)

Airspace	*Special Use Area*	*Designation*	*Total Area of Airspace (acres)*	*Total Area of Special Use Area (acres)*	*Special Use Area Within Airspace (acres)*	*% of Special Use Area Within Airspace*	*% of Airspace Which is Special Use Area*
Stony A MOA	Stony River	Alaska Native Village Statistical Area	3,430,001	13,018	3,019	23.19	0.09
Stony B MOA	Calista	Alaska Native Regional Corp.	2,016,837	33,099,981	1,441,097	4.35	71.45
Stony B MOA	Crooked Creek	Alaska Native Village Statistical Area	2,016,837	27,906	15,159	54.32	0.75
Stony B MOA	Doyon	Alaska Native Regional Corp.	2,016,837	127,831,010	499,096	0.39	24.75
Stony B MOA	Georgetown	Alaska Native Village Statistical Area	2,016,837	16,659	16,659	100.00	0.83
Stony B MOA	Red Devil	Alaska Native Village Statistical Area	2,016,837	16,275	16,275	100.00	0.81
Stony B MOA	Sleetmute	Alaska Native Village Statistical Area	2,016,837	18,945	18,945	100.00	0.94
Stony B MOA	Stony River	Alaska Native Village Statistical Area	2,016,837	13,018	9,999	76.81	0.50
Susitna MOA	Cook Inlet	Alaska Native Regional Corp.	2,098,465	21,308,085	1,716,651	8.06	81.81
Susitna MOA	Denali National Park & Preserve	National Park National Preserve	2,098,465	6,029,385	553,989 391,748	9.19 6.5	26.4 18.67
Susitna MOA	Denali State Park	State Park	2,098,465	324,242	50,985	15.72	2.43
Susitna MOA	Doyon	Alaska Native Regional Corp.	2,098,465	127,831,010	381,175	0.30	18.16
Yukon 1 MOA	Chena River State Rec Area	State Recreation Area	3,198,318	303,481.281	256,708.482	84.59	8.03
Yukon 1 MOA	Doyon	Alaska Native Regional Corp.	3,198,318	127,831,010	3,198,318	2.50	100.00
Yukon 1 MOA	Fortymile Wild & Scenic River	Wild and Scenic River	3,198,318	226,745	673	0.30	0.02
Yukon 1 MOA	Healy Lake	Alaska Native Village Statistical Area	3,198,318	109,933	1	0.00	0.00
Yukon 1 MOA	Yukon-Charley Rivers National Preserve	National Preserve	3,198,318	2,521,315	499,384	19.81	15.61
Yukon 2 MOA	Birch Creek Wild & Scenic River	Wild and Scenic River	4,180,238	68,867	68,867	100.00	1.65
Yukon 2 MOA Restricted Area 2205	Chena River State Rec Area	State Recreation Area	4,180,238	303481.281	46087.982	15.19	1.10
Yukon 2 MOA	Circle	Alaska Native Village Statistical Area	4,180,238	3,643	3,643	100.00	0.09
Yukon 2 MOA	Doyon	Alaska Native Regional Corp.	4,180,238	127,831,010	4,176,595	3.27	99.91

Table 4.8-1. Special Use Areas within F-22A Airspace (Page 3 of 3)

Airspace	*Special Use Area*	*Designation*	*Total Area of Airspace (acres)*	*Total Area of Special Use Area (acres)*	*Special Use Area Within Airspace (acres)*	*% of Special Use Area Within Airspace*	*% of Airspace Which is Special Use Area*
Yukon 2 MOA	Steese National Conservation Area	National Conservation Area	4,180,238	1,154,018	785,042	68.03	18.78
Yukon 2 MOA	Yukon Flats National Wildlife Refuge	National Wildlife Refuge	4,180,238	11,172,807	654,752	5.86	15.66
Yukon 2 MOA	Yukon-Charley Rivers National Preserve	National Preserve	4,180,238	2,521,315	592,117	23.48	14.16
Yukon 3 MOA	Doyon	Alaska Native Regional Corp.	3,207,858	127,831,010	3,194,193	2.50	99.57
Yukon 3 MOA	Eagle	Alaska Native Village Statistical Area	3,207,858	23,353	13,665	58.52	0.43
Yukon 3 MOA	Fortymile Wild & Scenic River	Wild and Scenic River	3,207,858	247,049	223,607	90.51	6.97
Yukon 3 MOA	Yukon-Charley Rivers National Preserve	National Preserve	3,207,858	2,521,315	375,752	14.90	11.71
Yukon 4 MOA	Doyon	Alaska Native Regional Corp.	2,846,455	127,831,010	2,846,455	2.23	100.00
Yukon 4 MOA	Yukon Flats National Wildlife Refuge	National Wildlife Refuge	2,846,455	11,172,807	149,644	1.34	5.26
Yukon 4 MOA	Yukon-Charley Rivers National Preserve	National Preserve	2,846,455	2,521,315	998,833	39.62	35.09
Yukon 5 MOA	Chalkyitsik	Alaska Native Village Statistical Area	2,285,414	1,546	1,546	100.00	0.07
Yukon 5 MOA	Doyon	Alaska Native Regional Corp.	2,285,414	127,831,010	2,283,868	1.79	99.93
Yukon 5 MOA	Yukon Flats National Wildlife Refuge	National Wildlife Refuge	2,285,414	11,172,807	1,469,990	13.16	64.32
Viper MOA	Doyon	Alaska Native Regional Corp.	68,181	127,831,010	68,181	0.05	100.00

MOA = Military Operations Area
Source: National Geospatial-Intelligence Agency 2005

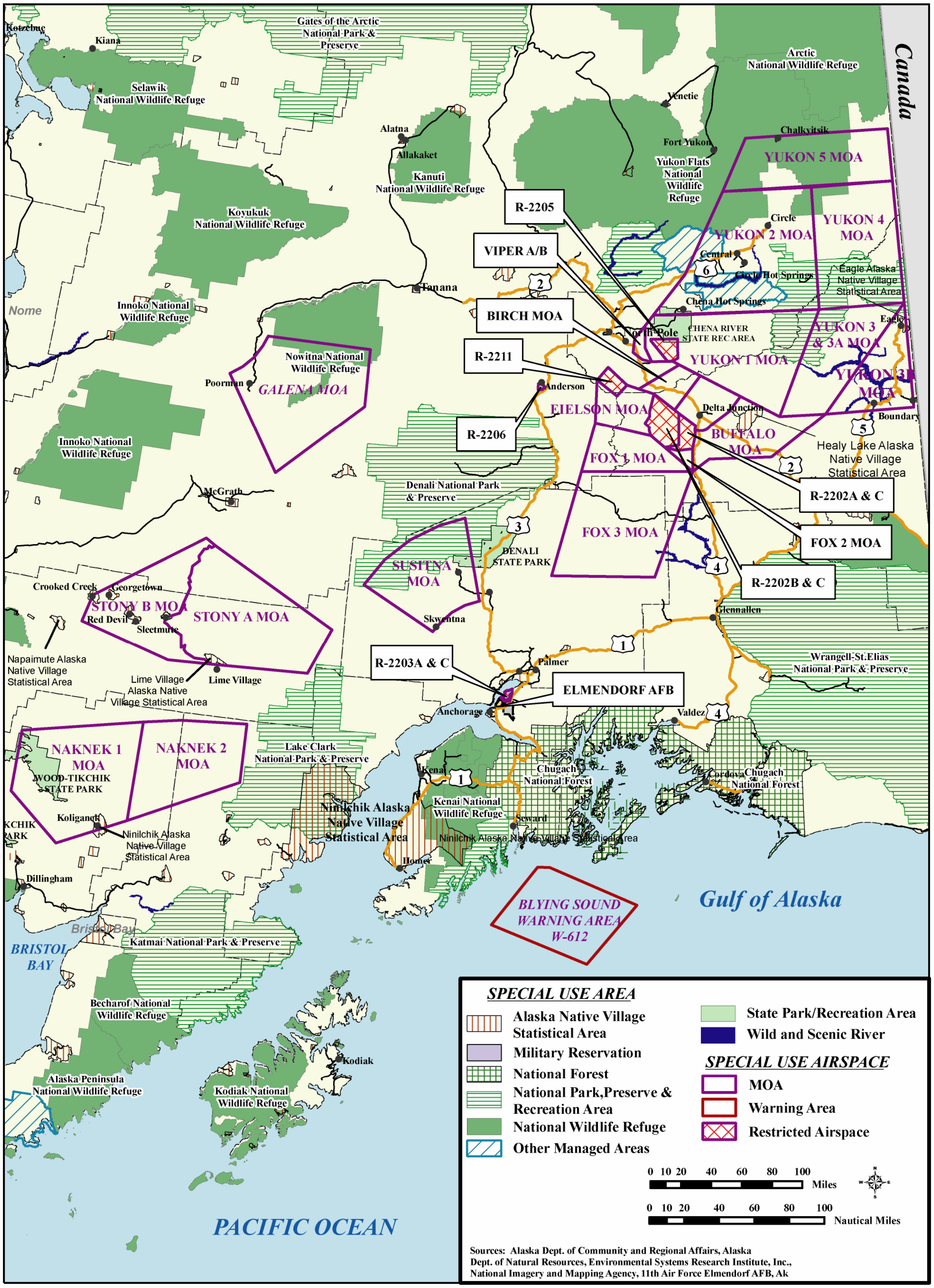

Figure 4.8-1. Special Use Areas Underlying Special Use Airspace

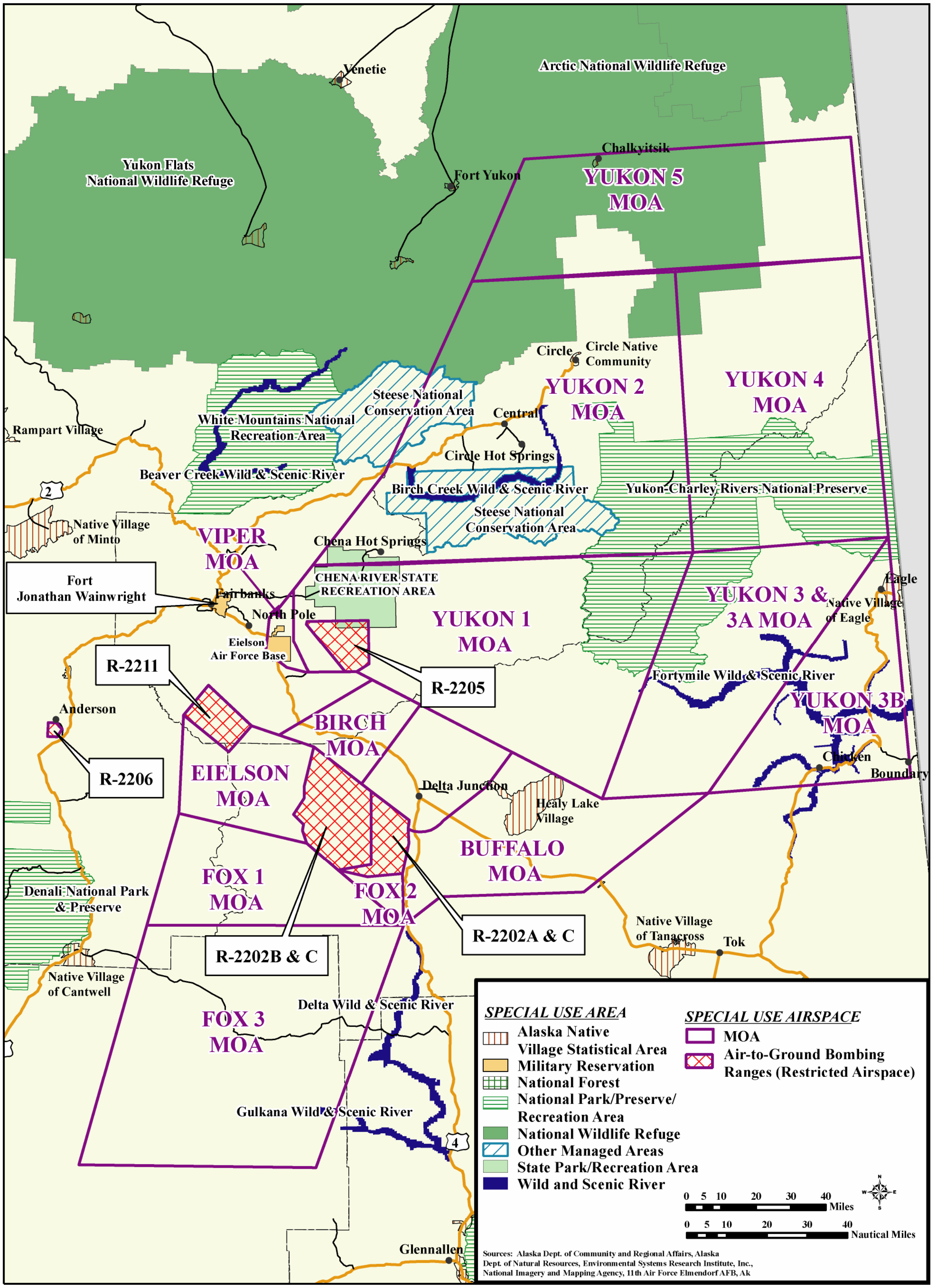

Figure 4.8-2. Special Use Areas Underlying Restricted Areas

Restricted Areas

With the exception of the Chena River State Recreation Area, no special land use areas occur under Restricted Areas. A small portion of the southern boundary of the Chena River State Recreation Area underlies Restricted Area 2205 (see Figure 4.8-2).

4.8.3 Environmental Consequences of Beddown

As the replacement for one F-15C squadron and one F-15E squadron at Elmendorf AFB, the two F-22A squadrons would conduct many of the same missions and training programs as the F-15C and F-15E. The Air Force expects the F-22A to use the training airspace associated with Elmendorf AFB in a manner similar to the F-15C and F-15E. No substantial change in sortie-operations is anticipated under the Proposed Action. The potential to affect land use within and under the airspace is slight. Such consequences would be indirect, stemming from aircraft overflights and aircraft noise.

Under the Proposed Action, subsonic noise would either decrease slightly or remain the same as under baseline conditions (refer to Section 3.2). Most annual average noise levels are expected to remain below 45 L_{dn}. Where noise levels are higher than 45 L_{dn}, they are expected to remain essentially the same under the Proposed Action as under existing conditions. The United States Environmental Protection Agency (USEPA) has identified an annual average noise level of 55 L_{dn} as a level to begin assessing the potential for noise impacts. With noise levels below 55 L_{dn} throughout the airspace, it is unlikely the land use patterns, ownership, or management practices would be affected by the use of the airspace for F-22A training.

Under the Stony MOAs, flight activities would increase sonic booms from the existing 15 to a projected 28 per month. Under the Stony, Fox, Naknek, and Yukon MOAs, sonic booms would increase by 1 to 4 per month (see Table 4.2-3). These changes are not likely to be detected except under the Stony MOAs. Under the Stony MOAs, residents and hunters, as well as visitors, could experience more sonic booms as a result of the increase in supersonic activities. It is possible that the increase in supersonic activity could be perceived by visitors to isolated areas as an unwanted intrusion that may impede management goals for special use areas under the MOAs.

Detected sonic booms have the potential to cause increased disturbance in recreational, hunting, or fishing areas. Under most airspaces, it is unlikely that any occasional visitor or hunter would discern the difference between the current number of sonic booms and the increased number associated with an F-22A beddown. Individuals who spend extensive time subsistence hunting and fishing under the Stony MOAs could discern an increase. The increased frequency of sonic booms would not be expected to affect land use or land use patterns, ownership, or management, but the increase could disturb some people.

Alaska Native Concerns

A number of Alaska Native villages and traditional subsistence areas underlie Alaskan SUA. Alaska Natives have expressed concern that existing and projected noise levels and sonic booms could affect recreational uses, as well as traditional hunting activity. In addition to being important social and cultural activities, the local economy is often dependent on subsistence activities. Scoping concerns were also raised regarding access to the villages such as potential conflicts between military and private aircraft. Private aircraft are an important means of accessing these remote villages and hunting areas. As noted above, average noise levels are not expected to increase under the MOAs, and a detectible increase in sonic booms could result in annoyance, but would not be expected to affect subsistence activities. Higher training altitudes and increased F-22A pilot situational awareness with the enhanced systems should minimally improve flight safety for general aviation.

4.8.4 No Action

Under the No Action Alternative, the F-22A would not be based at Elmendorf AFB. The Air Force would continue to use the training airspace with Elmendorf AFB-based aircraft. No changes associated with aircraft overflights and aircraft noise to special land use or recreational areas would be anticipated.

4.9 Socioeconomics

Socioeconomic factors are defined as the basic attributes and resources associated with the human environment, including population and economic activity. Data for the socioeconomic analysis in this EA were obtained from the U.S. Bureau of the Census and the Alaska Departments of Commerce and Labor.

4.9.1 Definition

Socioeconomic resources evaluated include areas around Elmendorf AFB as well as geographic areas under or proximate to the training airspace. The nine geographic areas considered are:

- Anchorage Municipality – not under training airspace
- Bethel Census Area – partially under Stony MOAs
- Dillingham Census Area – partially under Naknek MOAs
- Fairbanks Northstar Borough – rural portions partially under Yukon MOAs and Viper A/B MOA
- Lake and Peninsula Borough – partially under Naknek 2 MOA
- Matanuska-Susitna Borough – rural portions partially under Susitna and Fox MOAs
- Southeast Fairbanks Census Area – partially under Yukon, Birch, and Buffalo MOAs
- Valdez-Cordova Census Area – not under training airspace
- Yukon-Koyukuk Census Area – partially under Galena and Stony MOAs

4.9.2 Existing Conditions

Lands under training airspace are very rural in nature, with sparsely scattered populations. With the exception of Anchorage Municipality, Fairbanks North Star, and the Matanuska-Susitna Borough, rural lands comprise two-thirds of the region and population density is 0.4 or fewer persons per square mile (see Table 4.9-1). The population centers are included for reference and they are not directly affected by training airspace. The average household size in the regions ranges from 2.80 persons per household in the southeast Fairbanks census area to 3.73 persons per household in the Bethel census area. By comparison, the state and Anchorage average household sizes are 2.74 and 2.62 persons per household, respectively. Housing vacancy rates range from a low of 18.5 percent in Bethel to a high of 62.2 percent in Lake and Peninsula Borough. The vacancy rates are primarily due to seasonal occupancy.

TABLE 4.9-1. DEMOGRAPHIC CHARACTERISTICS OF AFFECTED REGIONS (2000)

	Total Population	*Percent Rural*	*Population Density*	*Average Household Size*	*Housing Vacancy Rate*
State of Alaska	626,932	34.4	1.1	2.74	15.1
Anchorage Municipality	260,283	3.9	153.4	2.67	5.5
Bethel Census Area	16,006	72.3	0.4	3.73	18.5
Dillingham Census Area	4,922	100.0	0.3	3.20	34.4
Fairbanks North Star Borough	82,840	30.4	11.2	2.68	10.6
Lake and Peninsula Borough	1,823	100.0	0.1	3.10	62.2
Matanuska-Susitna Borough	59,322	64.5	2.4	2.84	24.8
Southeast Fairbanks Census Area	6,174	100.0	0.2	2.80	34.9
Valdez-Cordova Census Area	10,195	100.0	0.3	2.58	24.6
Yukon-Koyukuk Census Area	6,551	100.0	<0.1	2.81	41.1

Source: U.S. Bureau of the Census 2000a.

Economic activity in the regions away from population centers revolves primarily around Alaska's natural resources. Government and government enterprises provide many jobs in these regions and provide a measure of stability through year-round employment. Seasonal employment that includes commercial fishing, guided hunting, and related industries are an important source of income. Population in many of these areas fluctuates throughout the year in response to seasonal activity. Resource-based tourism, mining, and oil/gas pursuits also contribute to regional economic activity. For many residents, subsistence fishing and hunting are important and contribute substantially to people's diets and supplementary income.

Seasonal unemployment rates vary widely in the regions in response to fluctuations in resource-based employment. Average annual unemployment rates vary from 4.7 percent in Anchorage Municipality to 12.5 percent in the Yukon-Koyukuk Census Area, in comparison to the state's average unemployment rate of 6.1 percent (see Table 4.9-2). Median household income and per capita personal income vary considerably. With nearly 50 percent of the state's population in the city of Anchorage and its environs, the household and personal income of Anchorage dominate the statistics. Most rural regions experience income levels lower than Anchorage or Anchorage-driven average state levels.

Table 4.9-2. Economic Characteristics of Regions (2000)

	Total Employment	*Percent Unemployment*	*Median Household Income*	*Per Capita Personal Income*
State of Alaska	281,532	6.1	$51,571	$22,660
Anchorage Municipality	125,737	4.7	$55,546	$25,287
Bethel Census Area	5,481	9.1	$35,701	$12,603
Dillingham Census Area	1,765	7.2	$43,079	$16,021
Fairbanks North Star Borough	35,258	5.8	$49,076	$21,553
Lake and Peninsula Borough	581	7.9	$36,442	$15,361
Matanuska-Susitna Borough	24,981	6.7	$51,221	$21,105
Southeast Fairbanks Census Area	1,932	9.5	$38,776	$16,679
Valdez-Cordova Census Area	4,463	6.3	$48,734	$23,046
Yukon-Koyukuk Census Area	2,276	12.5	$28,666	$13,720

Source: U.S. Bureau of the Census 2000b.

4.9.3 Environmental Consequences of Beddown

A number of Alaska Native villages and traditional subsistence areas underlie Alaskan SUA. The local economy in many of these villages is based primarily on subsistence activities. The proposed change of training aircraft from two squadrons of F-15C and one squadron of F-15E to one squadron of F-15C and two squadrons of F-22A is not expected to discernibly affect annual average noise levels under the training airspace. The F-22A generally flies at higher altitudes and the resulting average noise levels are not greater than those experienced with the F-15C and F-15E training.

The single exception is in the area of sonic booms. The supersonic capabilities of F-22A aircraft permit it to fly at supersonic speed an estimated 25 percent of its training mission as opposed to 7.5 percent for the F-15C and F-15E training missions. Although the F-22A flies higher and thus the energy from sonic booms is more likely to dissipate, a noticeable increase in sonic booms from the existing 15 to a projected 28 per month under the Stony MOAs. This increase could be noticeable to individuals spending extended time under the airspace. The nature of sonic booms is such that they can be heard, often as a rolling thunder sound, in areas on the edge of the airspace boundaries. Sonic booms, or the increase in sonic booms, are not expected to significantly affect subsistence, recreational hunting or fishing, on the local economy. However, sonic booms could be viewed as unwelcome intrusions to activities in remote areas. For any damage claims associated with sonic booms, the Air Force has established procedures that begin with contacting the Elmendorf AFB Public Affairs Office.

Alaska Native Concerns

The economy of Alaska Native villages and traditional subsistence areas that underlie Alaskan SUA is often based on subsistence activities. Some Alaska Natives have expressed concerned that sonic booms could affect game in traditional hunting areas or military flights could affect the use of private aircraft to access hunting or fishing locations.

The change in sonic booms may be discernible to Alaska Natives or others residing under or using the land under the airspace for an extended period of time. Increases in sonic booms would not be expected to substantially affect subsistence or guided hunting or fishing. Elmendorf AFB has an established scheduling of airspace use to avoid, to the extent possible, training in airspace over areas at the beginning of hunting or fishing seasons reduces potential conflicts with subsistence and recreational hunting and fishing. For any damage claims associated with sonic booms, the Air Force has established procedures that begin with contacting the Elmendorf AFB Public Affairs Office.

Commentors during scoping wanted to know if military flights could affect the use of private aircraft and thereby potentially affect the local economy dependent on traditional subsistence activities. The F-22A improves pilot awareness of other aircraft and the F-22A flight profiles reduce low level military flights. The local economy dependent on traditional resources and on private aircraft would minimally benefit from the Proposed Action.

4.9.4 No Action

Under the No Action Alternative, no changes in flight activity, facilities, or personnel are anticipated. Annual average noise levels and supersonic training events would continue as at present.

4.10 Environmental Justice

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs federal agencies to address environmental and human health conditions in minority and low-income communities. In addition to environmental justice concerns are those pursuant to EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, which directs federal agencies to identify and assess environmental health and safety risks that may disproportionately affect children.

For purposes of this analysis, minority, low-income and youth populations are defined as follows:

- *Minority Population*: Alaska Natives, persons of Hispanic origin of any race, Blacks, American Indians, Asians, or Pacific Islanders.
- *Low-Income Population*: Persons living below the poverty level.
- *Youth Population*: Children under the age of 18 years.

Estimates of these three population categories were developed based on data from the U.S. Bureau of the Census. The census does not report minority population, per se, but reports population by race and by ethnic origin. These data were used to estimate minority populations potentially affected by implementation of the Proposed Action. Low-income and youth population figures also were drawn from the Census 2000 Profile of General Demographic Characteristics.

4.10.1 Definition

As with socioeconomic resources, evaluation of environmental justice evaluates nine geographic areas that include areas under the affected airspace and large municipalities near the airspace:

- Anchorage Municipality – not under training airspace

- Bethel Census Area – partially under Stony MOAs
- Dillingham Census Area – partially under Naknek MOAs
- Fairbanks Northstar Borough – rural portions partially under Yukon MOAs and Viper A/B MOA
- Lake and Peninsula Borough – partially under Naknek 2 MOA
- Matanuska-Susitna Borough – rural portions partially under Susitna and Fox MOAs
- Southeast Fairbanks Census Area – partially under Yukon, Birch, and Buffalo MOAs
- Valdez-Cordova Census Area – not under training airspace
- Yukon-Koyukuk Census Area – partially under Galena and Stony MOAs

4.10.2 Existing Military Training in Special Use Airspace

Alaska Natives live on many land areas under the affected airspace. Specific communities are identified under specific airspace units in Section 4.7.2. Federally recognized Alaska Natives under the airspace include Crooked Creek, settled by Eskimo and Ingalik people; Georgetown, a seasonal fishing village; Lime village, a Dena'ina Athabascan Indian settlement; Red Devil, a village populated by a mix of Eskimo, Athabascan, and non-native inhabitants; Sleetmute, founded by Ingalik Indians; Stony River, a mix of Indian and Eskimo people; and Koliganek (U.S. Bureau of the Census 2000a). Other federally recognized Alaska Natives in the area include Eagle, Circle, Chalkyitsik, Dot Lake, and Healy Lake. Native lifestyle in many of these villages is based on or supplemented by subsistence activities. Alaska Native Corporations in the region are Cook Inlet, Calista, Doyon, and Bristol Bay. Additional baseline data on minority, low-income, and youth populations in areas under the airspace are presented in Table 4.10-1.

Table 4.10-1. Minority and Low-Income Populations by Area (2000)

	Total Population	*Percent Low-Income*	*Percent Minority*	*Percent Alaska Native*	*Percent Youth*
State of Alaska	626,932	9.4	32.4	15.4	30.4
Anchorage Municipality	260,283	7.3	30.1	7.0	29.1
Bethel Census Area	16,006	20.6	87.8	81.6	39.8
Dillingham Census Area	4,922	21.4	79.1	69.4	38.1
Fairbanks North Star Borough	82,840	7.8	24.0	6.8	30.1
Lake and Peninsula Borough	1,823	18.9	81.2	73.0	37.8
Matanuska-Susitna Borough	59,322	11.0	13.7	5.3	32.2
Southeast Fairbanks Census Area	6,174	18.9	22.6	12.6	32.8
Valdez-Cordova Census Area	10,195	9.8	25.3	13.0	29.6
Yukon-Koyukuk Census Area	6,551	23.8	76.0	70.4	35.0

Source: U.S. Bureau of the Census 2000a, 2005.

Based on 2000 Census data, the incidence of persons and families in the ROI with incomes below the poverty level generally exceeded state levels (see Table 4.10-1). Poverty rates in the affected regions under the training airspace ranged from a low of 18.9 percent in Lake and Peninsula and southeast Fairbanks to a high of 23.8 percent in Yukon-Koyukuk Census Area, compared to 9.5 percent of persons in the state and 7.3 percent of persons in Anchorage.

Minority persons represent between 22.6 percent and 87.8 percent of the regions' population. Alaska Natives are by far the largest minority group, accounting for nearly the entire minority population and comprising over two-thirds of the total population in some areas under the training airspace. By comparison, minority persons represent 32.4 percent of the state population, with Alaska Natives accounting for 15.4 percent of the state total population and 47.5 percent of the state minority population. Youths under the age of 18 comprise between 32.8 percent and 39.8 percent of the population under the airspace, compared to 30.4 percent at the state level and 29.1 percent in Anchorage.

4.10.3 Environmental Consequences of Beddown

Alaska Natives are primary users of the natural resources under the training airspace. For many residents, subsistence fishing and hunting are vital, contributing substantially to people's diets and providing much-needed supplementary income. Individuals from these groups have expressed concerns related to aircraft noise impacts on their villages and on subsistence hunting under the airspace. Under the Proposed Action, subsonic noise levels within the MOAs would be approximately the same or slightly less than currently occurs under the airspace. Increases in supersonic flight would increase the number of sonic booms noticeably under the Stony MOAs. The increase would be from an existing 15 to a projected 28 booms per month. Under the Fox MOAs and Yukon 3 MOAs, sonic booms would increase by 1 to 4 per month. Alaska Natives hunting or fishing under most of these airspaces would be unlikely to detect an increase. The increase in sonic booms under the Stony MOAs could disturb some individuals who discerned the change.

Alaska Natives and others participating in scoping meetings did not cite sonic booms as events that interfered with hunting or fishing activities. The Elmendorf airspace managers seek to take into consideration hunting and fishing seasons while scheduling airspace use for training. Continued attention to airspace scheduling, hunting and fishing seasons, and Alaska Native concerns in airspace management reduces the potential for environmental consequences associated with sonic booms.

The random nature and intensity of sonic booms throughout the area under an airspace make it impossible to avoid a specific community. Sonic boom intensity can vary from the rolling sound of distant thunder to a sharp double crack (see Appendix D). Although the number of sonic events would be expected to increase under specific MOAs, the booms would not be expected to disproportionately affect communities. The change in aircraft from F-15C and F-15E to F-22A and F-15C and associated changes in sonic booms would not be expected to disproportionately affect children.

The large rural Alaska Native population throughout the state of Alaska, as well as under the existing airspace, results in no disproportionate impacts expected to occur to any area of minority populations.

Alaska Native Concerns

As noted above, Alaska Natives live under many of the affected MOAs and they are primary users of the resources under the airspace. Section 4.9.3 explains why the Proposed Action would not be expected to discernibly affect small aircraft use, hunting, or fishing. The large rural Alaska Native population is located throughout the state of Alaska, as well as under the existing airspace. Use of training airspace is not projected to disproportionately impact minority populations under the airspace.

4.10.4 No Action

Under the No Action Alternative, no changes in flight activity, facilities, or personnel are anticipated. No change from existing supersonic training within the airspaces would occur.

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